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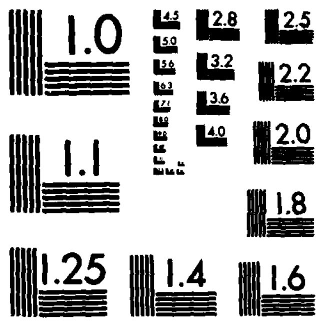

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TEST EXCAVATIONS AT PAINTED ROCK RESERVOIR: SITES AZ Z:1:7, AZ Z:1:8, AND AZ S:16:36

By

Lynn S. Teague

Contributions by

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Mary Kay O'Rourke
Jerome C. Rose and Dale M. Fournier

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CULTURAL RESOURCE MANAGEMENT DIVISION
ARIZONA STATE MUSEUM
UNIVERSITY OF ARIZONA

NOVEMBER 1981

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Prepared for

The United States Army Corps of Engineers

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Cultural Resource Management Division
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ABSTRACT

This report describes the results of test excavations undertaken by the Arizona State Museum during 1978 and 1979 in the vicinity of Gila Bend, Arizona, for the U.S. Army Corps of Engineers. Excavations at AZ Z:1:7 and AZ Z:1:8 involved Santa Cruz and Sacaton Phase Hohokam components within an area that was scheduled for agricultural development.

Excavations at AZ S:16:36 were undertaken in connection with proposed modifications of the borrow area at Painted Rock Dam. This site consisted of rock circles and was apparently typical of an interesting archaeological complex concentrated on the northern terraces of the Gila River. Testing results were inconclusive with respect to the cultural affiliation and function of these sites.

The report includes a reassessment of prehistory in the Gila Bend area. It is intended to provide a context for the evaluation of the data derived from these sites. This reassessment is unquestionably speculative. It is hoped, however, that it may encourage others to perform further research in the area.

ACKNOWLEDGMENTS

The work represented by this report would not have been possible without the generous assistance of those who were willing to go to Gila Bend in the heat of the summer. Particular gratitude is owed to those who did so as volunteers. The July, 1978, crew at AZ Z:1:7 and AZ Z:1:8 consisted of Anne Baldwin, Carol Coe, Jon Czaplicki, Gayle Hartmann, Sharon Urban, and David Wilcox of the Arizona State Museum, and Patricia Martz and Richard Macias of the U.S. Army Corps of Engineers. Alan Sullivan, Carol Heathington, and Susan A. Brew were the crew at AZ S:16:36 in the equally unpleasant weather of September, 1979.

The work would not have been possible without the support of the U.S. Army Corps of Engineers, Los Angeles District, and the exceptional interest and enthusiasm of Patricia Martz.

We are also greatly indebted to Robert Stiles and Palomas Ranches for delaying their work to permit us to conduct excavations.

The assistance of David Gregory, Bruce Huckell, and David Wilcox has been very helpful. As usual, these individuals must be absolved of any responsibility for error or foolishness.

Finally, we would like to express our deep appreciation to John Laird and Norton Allen, who have generously shared their time and their extensive knowledge of the prehistory of the Gila Bend area.

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CHAPTER 1

INTRODUCTION

This report presents the results of test excavations conducted in the Painted Rock Reservoir area on two separate occasions by personnel of the Arizona State Museum. The first of the two excavations took place in July, 1978, and involved two Hohokam sites, AZ Z:1:7 and AZ Z:1:8. The second took place in September, 1979, and included testing at a site within the Painted Rock Dam borrow and recreational area in order to determine significance and eligibility for the National Register of Historic Places. This site, AZ S:16:36, is a previously unrecorded example of the rock circle and trail complexes reported in the Phase I survey report (Teague and Baldwin 1978). Site locations are presented in Figure 1.

AZ Z:1:7 and AZ Z:1:8

In May, 1978, the Painted Rock Reservoir Phase I archaeological survey crew identified an apparent Hohokam village site within a sample unit scheduled for immediate agricultural development. Review of the site files indicated that this site, AZ Z:1:8, was one of those identified during earlier work for the U.S. Army Corps of Engineers (Schroeder 1961). An adjacent site, AZ Z:1:7, was also identified by Schroeder. Information recorded during the initial survey indicated a Colonial and Sedentary Period occupation at the sites, dating within the A.D. 700-1100 range.

Depletion of cultural resources was occurring rapidly in the Gila Bend area, and it was feared that yet another village site recorded during the initial Arizona State Museum investigations at Painted Rock would be lost without any opportunity for excavation. This was considered particularly unfortunate becuase earlier excavations (Wasley and Johnson 1965) had focused almost exclusively on Hohokam villages having ballcourts. AZ Z:1:7 and AZ Z:1:8, which present no visible evidence of the presence of a ballcourt, had therefore not been studied and could provide information on an aspect of the Hohokam occupation in the Gila Bend area for which only survey data were available.

Because the proposed leveling of the area was not directly related to federal-agency activities, work at the sites was necessarily very limited and dependent on the cooperation of various individuals and organizations. Palomas Ranches, owner of the property, delayed its scheduled development work in the site area and made it possible to organize an

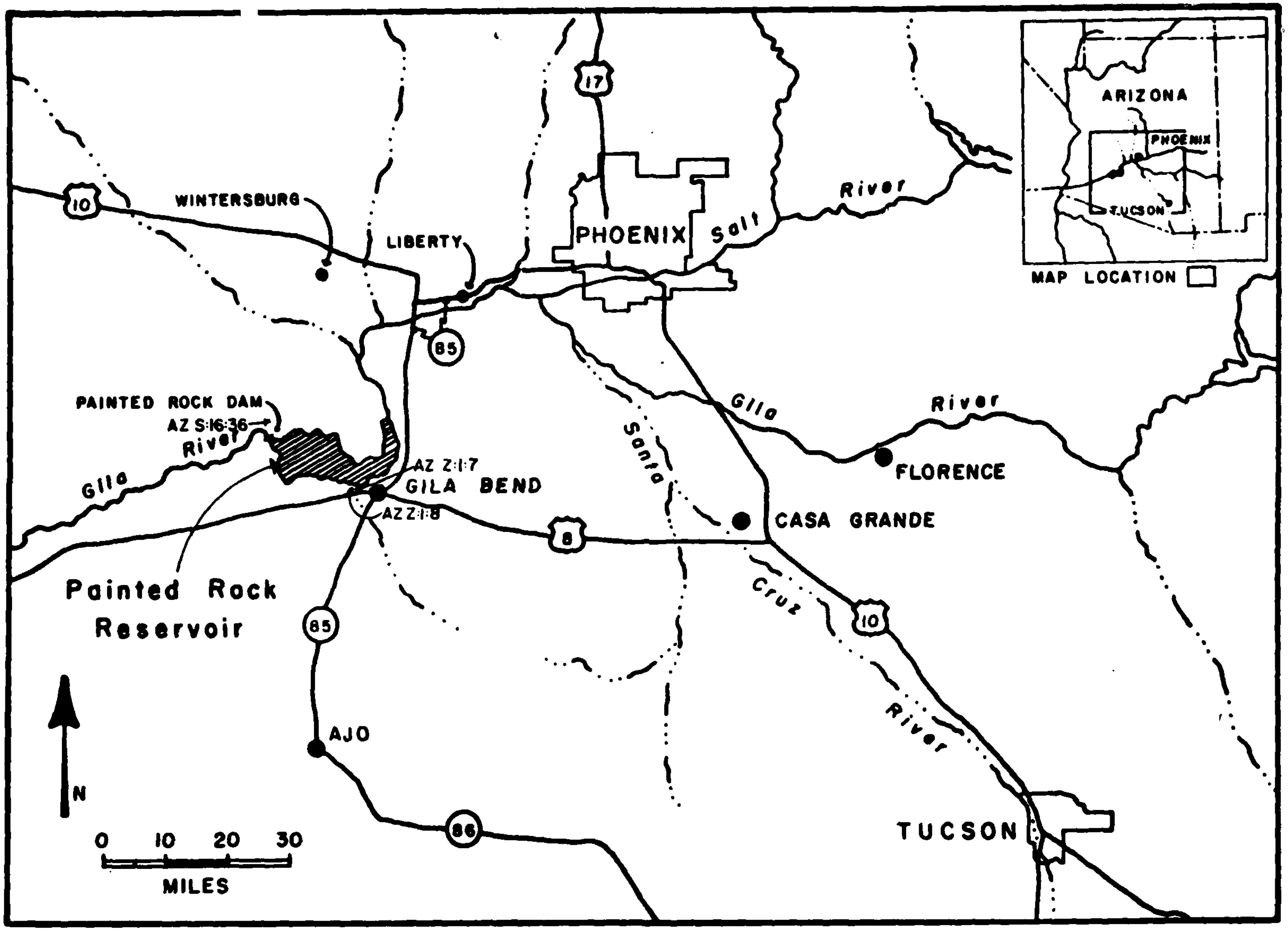

Figure 1. Location of the Painted Rock Reservoir Test Excavations

effort to conduct one week of test excavations. The U.S. Army Corps of Engineers provided partial funding for the work, including support for backhoe time, several laborers, and specialized analysis.

The testing took place between July 10 and 14, 1978. The crew, largely composed of volunteers, was supervised by Lynn S. Teague. Patricia Martz and Richard Macias of the Corps of Engineers participated for several days. Three laborers were funded through the Corps' support. The remaining six members of the crew were associated with the Arizona State Museum. A total of about 50 person-days was spent testing the sites.

AZ S:16:36

This site was first reported by Troy Leatherwood of the Corps of Engineers and was recorded during the September, 1979, survey of the borrow and recreational area by personnel of the Arizona State Museum. Test excavations were conducted at the same time. Given the many unanswered questions about the "rock circle sites" (Teague and Baldwin 1978), it was known before the project began that no reasonable determination of significance and eligibility for the National Register of Historic Places would be possible without excavation and analysis of these features. Three days for testing, as well as funding for artifact and environmental analysis, were therefore incorporated within the survey budget and schedule. The survey crew, consisting of Alan Sullivan and Carol Heathington, was supplemented for the testing by Susan A. Brew, Project Director. A total of nine person-days was spent in test excavations at this site between September 10 and 12, 1979.

Site Environment

The environment of the Painted Rock Reservoir has been described by Vogler in an earlier report (1976). As noted in that report, the reservoir falls within the Sonoran Basin-and-Range Province and includes the Gila River Valley from a point approximately 16 km north of Gila Bend to the dam site at the Painted Rock Mountains, about 32 km northwest of Gila Bend. The climate is arid, with precipitation averaging 5.69 inches (14.45 cm) annually, and is frequently hot, with a mean maximum temperature of 108 degrees F (42 degrees C) and a mean minimum temperature of 36 degrees F (2 degrees C). The floodplain of the Gila is composed of rich alluvium, with terraces characterized by desert-pavement cover. Although precipitation is limited, the availability of water from the Gila (in the past a permanent stream) and of arable land has made the area excellent for agriculture, both prehistorically and historically.

Painted Rock Reservoir lies within the Lower Sonoran life zone. On the floodplain and lower terraces, the dominant natural vegetation is desertshrub, with smaller areas of mesquite and annual communities. The creosote-bush communities dominate the second terrace and portions of the first terrace and are particularly prevalent in the northwestern and southwestern parts of the reservoir. The environmental stratification

of the area for the Phase I survey conducted by the Arizona State Museum reflects these characteristics of the project area. A map of the strata defined during Phase I is provided in the report on this earlier study (Teague and Baldwin 1978:46).

AZ Z:1:7 and AZ Z:1:8

AZ Z:1:7 and AZ Z:1:8 are located on the first terrace of the Gila about 4 km northwest of Gila Bend, at an elevation of about 192 m above sea level. It is possible to generalize from Phase I (Teague and Baldwin 1978) and earlier (Wasley and Johnson 1965) study results that the environment in which AZ Z:1:7 and AZ Z:1:8 are located is characterized by a relatively high density of sites, and contains most of the Preclassic Hohokam villages within the reservoir area, as well as smaller, more specialized sites. Although the sites are situated in an area classified as "crop land" for purposes of the Phase I survey, one may reasonably infer that they were characterized by desertshrub vegetation prior to agricultural use. Lying immediately above the Gila floodplain and between two substantial drainages, this area would have provided an excellent location for irrigated agriculture on the terraces as well as for unirrigated farming in the nearby floodplain. Results of the Phase I survey indicate a site density of 3 to 18 sites per square mile in terrace crop lands. The broad range for the terrace desertshrub area density estimates may reflect variability between terraces; there appear to be significantly higher site densities on the first terrace than on the second. The site densities in the crop land undoubtedly reflect reduced site visibility and the destruction of sites in areas developed for agriculture.

In the immediate vicinity of AZ Z:1:7 and AZ Z:1:8, current vegetation is largely a product of disturbance. Parts of the site areas themselves were farmed using earlier, less destructive agricultural techniques. Vegetation is most dense along the minor wash that now runs through AZ Z:1:8; the age of this feature has not been established.

Low hills and ridges are prominent within the site areas. The least disturbed portions of the sites are represented by the tops of these features. Sheetwash erosion has affected the slopes and many intermediate areas.

AZ S:16:36

AZ S:16:36 is located west of Painted Rock Dam on a hill above the heavily disturbed borrow area created by dam construction. The elevation at the site is 600 feet (180 m) above sea level. The site lies within the terrace creosote-bush environmental stratum as defined for the Phase I survey at Painted Rock Reservoir. In general, this area produces fewer economically useful plants than the desertshrub stratum in which Hohokam villages are located. It was found during the Phase I

survey to contain many of the "rock circle sites" similar to AZ S:16:36. The relative undesirability of this environmental stratum is dictated not only by the absence or scarcity of many of the economically valuable plants characteristic of other communities, but also by a heavy basalt-cobble ground cover. The character of this stratum has contributed to the difficulties associated with interpreting these sites. It should be noted, however, that these sites are generally not far removed from the more suitable floodplain environments of the Gila, where many more economically useful resources are present.

CHAPTER 2

THE PREHISTORY OF THE GILA BEND AREA

Controversies concerning the prehistory of the Painted Rock Reservoir area have centered on the cultural identity of populations that resided there at various times. Schroeder (1967) has suggested either a Patayan, or Yuman, origin for the pre-Sedentary Period occupation, a Hohokam occupation during the Sedentary Period, and the presence of a Patayan population during and after the Classic Period (see Table 1 for Hohokam chronology). Wasley and Johnson (1965) argue in favor of a Hohokam occupation from the Colonial through the Classic Periods, with Yuman intrusions into the area during the Sedentary and Classic Periods. These reconstructions assume that any populations formerly present within this area can be identified with one or the other of these larger cultural units; it is this assumption that appears to be the core of the problem in resolving these issues. This area can be viewed more profitably as a border zone occupied by populations that participated, at different times and to varying degrees, in what Wilcox (1979) has aptly termed the "Hohokam regional system." Study of the area can contribute a great deal to a better understanding of this system and to the identification of the elements that were crucial to the interpretation of the geographically dispersed groups of people who appear to have participated in it.

Pioneer Period

The Gila Bend area seems to have been consistently different from the central Salt-Gila area and from the other peripheral areas both in specific elements of material culture and economy and in the general trends that are represented. The earliest archaeologically attested appearance of a post-Archaic population in the area is represented by village sites, dating to the Sweetwater through Gila Butte Phases, in the foothills of the Sand Tank Mountains. These sites exhibit many of the distinguishing characteristics of the Hohokam (such as typically Hohokam decorated ceramics and cremations) but are situated far from locations suitable for the riverine agriculture so often regarded as the characteristic feature of Hohokam society. (These sites were located and reported to the author by John Laird.)

Although gaps in our knowledge of the area could account for the apparent pattern of an exclusively upland occupation during the Pioneer Period, this seems unlikely. A series of professional surveys in the area has provided no evidence of Pioneer Period lowland villages, nor do

Table 1. Chronological relationships between the River and Desert Hohokam sequences

		DESERT HOHOKAM	RIVER HOHOKAM		RIVER HOHOKAM	
		PAPAGUERÍA[1]	TUCSON BASIN[2]	GILA BASIN[3]	GILA BASIN[4] 1976 (revised)	
A.D.1400	CLASSIC	SELLS A.D.1250-1400	TUCSON	CIVANO A.D.1300-1400	CIVANO A.D.1300-1450	CLASSIC
	CLASSIC		TANQUE VERDE	SOHO 1200 or 1250-1300 (AD)	SOHO A.D.1100-1300	CLASSIC
1200	SEDENTARY	TOPAWA A.D.1100-1250	CORTARO ?	SANTAN A.D.1100-1200		
1000	SEDENTARY	VAMORI A.D.800-1100	RINCON	SACATON A.D. 900-1100	SACATON A.D.900-1100	SEDENTARY
800	COLONIAL		RILLITO	SANTA CRUZ A.D.700-900	SANTA CRUZ A.D.700-900	COLONIAL
600	COLONIAL		CAÑADA DEL ORO	GILA BUTTE A.D.500-700	GILA BUTTE A.D.550-700	COLONIAL
400	PIONEER		SNAKETOWN	SNAKETOWN A.D.300-500	SNAKETOWN A.D.350-550	PIONEER
200	PIONEER		SWEETWATER ? (isolated sherd)	SWEETWATER A.D.100-300	SWEETWATER A.D.200-350	PIONEER
A.D.1	PIONEER			ESTRELLA 100B.C.-A.D.100	ESTRELLA A.D.100-200	PIONEER
200B.C.	PIONEER			VAHKI 300 B.C.-100 B.C.	VAHKI 300B.C.-A.D.1	PIONEER

1. AFTER HAURY (1950 6-13,16, Figure 2).
2. AFTER HAURY (1950 16, Figure 2); KELLY (1978: 4, Table 1.1).
3. AFTER HAURY (1950 16, Figure 2); KELLY (1978: 4, Table 1.1).
4. AFTER HAURY (1976: 338, Table 16.1). NOTE REVISED DATE FOR SEDENTARY/ CLASSIC TRANSITION.

active local amateurs know of such sites. Wasley and Johnson (1965) state that Pioneer Period ceramics have been reported from several of the Painted Rock Reservoir sites, among them AZ Z:1:8; these reports are, however, unsubstantiated and, furthermore, are suggestive of a temporary presence in the area rather than permanent villages. Schroeder (1961) lists no sites in the Painted Rock Reservoir as having ceramics that date earlier than the Gila Butte Phase (A.D. 500-700).

Although agriculture may have been practiced in the well-watered foothill environments, artificial manipulation of the water supply would have been confined to conservation and diversion of direct rainfall and runoff. A heavy dependence upon naturally-occurring resources could be expected; the area now supports an abundance of mesquite and other useful plant food sources, as well as deer and other game. The presence of major springs in the area might have encouraged similar productivity in the past and could have provided water for domestic use and limited agriculture.

Further evidence of divergence from the Pioneer Period Hohokam of the central area may be provided by the material culture. Gila Plain, Gila Bend variety sherds (characterized by the near absence of mica temper) appear at the early sites in the Sand Tank Mountains. Without excavation, the association of these sherds with the Pioneer Period cannot be demonstrated, but this does suggest that differentiation from the central Salt-Gila in material culture may not have been a product of divergence through time. Nor does unavailability of appropriate materials account for this difference; these sites are naturally littered with mica schist.

On the whole, then, the rather limited evidence for the Hohokam Pioneer Period in the Gila Bend area suggests a view of development different from the traditional one in the central Salt-Gila. In that area, the earliest Hohokam sites are located in riverine environments. Haury (1976) dates the appearance of irrigation to the earliest phase of the Pioneer Period, while others contend that irrigation may have been introduced later (Wilcox and Shenk 1977) and that the initial riverine adaptation may have involved floodwater farming rather than irrigation. In either case, the Pioneer Period Hohokam adaptation of central Hohokam traits seems to have involved an emphasis on the use of river valley locations and an economic dependence on the resources of these environments. This apparently was not the case in the Gila Bend area.

The Gila Bend pattern does seem consistent with Haury's proposal that indigenous groups living in upland locations coexisted for a time with the riverine Hohokam and were later integrated into the Hohokam cultural system (Haury 1976:352). One does not have to accept a Mesoamerican origin for the basic Hohokam cultural pattern (currently available information from the Gila Bend area is too sparse to shed much light on this issue) to propose that this unquestionably peripheral area might have supported indigenous populations derived from Archaic groups. These populations would have gone through a rather slow process of integration into the increasingly dominant pattern of riverine sedentism.

At Gila Bend, then, the earliest sites represent an economic pattern very different from that of the riverine Hohokam, and a material culture already showing evidence of the local ceramic traditions that characterize the area throughout its prehistory. Certainly irrigation agriculture was feasible; this is demonstrated by the later, very successful use of this technology in the Gila Bend area. Similarly, manufacture of ceramics having the micaceous temper of Gila Plain would have been feasible. These differences were clearly not dictated by necessity arising from local environmental constraints. These people were becoming "Hohokam," but had not duplicated the characteristic patterns of that society to the extent that would have been possible.

This raises the question of what integrative mechanisms may have operated to draw this peripheral population increasingly into the Hohokam regional system. The economic advantages of irrigation agriculture might seem to be the most obvious of these, but the little evidence we have suggests that this was not the case at Gila Bend. While already very obviously Hohokam in basic material culture, these people were not practicing irrigation agriculture. If Wilcox and Shenk are correct in their proposal that irrigation began later than Haury thinks, floodwater farming might well not have presented any conspicuous advantages over the resources available in the foothills. It is unnecessary to resolve this question, however, in order to conclude that riverine agriculture was not the principal element in early integration of the people of Gila Bend into the Hohokam regional system.

The exchange of economically valuable commodities may have been a major integrating factor in this area. Although trade may not have been sufficient in itself to bind the two groups together, it is clear that during the Pioneer Period the people of the central Salt-Gila region would have had access to greater quantities of domesticates than did the upland-living people of Gila Bend, and that the people of Gila Bend would have had greater access to the resources of the south and west. One of the most conspicuous of these nonagricultural resources is shell. The existence of a substantial trade in shell from the Gulf of California during the Pioneer Period has been documented (Haury 1976:319), and the central location of Gila Bend for such exchange is both geographically obvious and supported by the location of slightly later routes that have been reconstructed on the basis of site locations.

It is not proposed here that exchange formed the principal basis of subsistence on the western periphery of the Hohokam at this or any other time, or that some highly organized trade system was in operation during the Pioneer Period. It is demonstrated, however, that trade existed and was reasonably substantial, and it is proposed that this trade was a significant factor in encouraging increased cultural homogeneity.

Colonial Period

During the Colonial Period, villages began to appear in the riverine environments. The Rock Ball Court Site, excavated by Wasley and Johnson, provides much of our information about this period in the Gila Bend area. Villages of this period were often located on terraces, thus confirming that irrigation agriculture rather than floodwater farming was associated with the movement of people into this environment.

Sites of this period are characterized by the presence of Hohokam decorated wares that Wasley and Johnson (1965) believe to have been locally produced; by Gila Plain, Gila Bend variety plain wares; and by rather unusual architectural features. The only ballcourt found dating to the Gila Butte Phase is at the Rock Ball Court Site. As its name suggests, this ballcourt differs in construction from those of the central Salt-Gila area. Although classified by Wasley and Johnson as Casa Grande in style, it can be better described as an only moderately successful local approximation of ballcourts elsewhere. The use of rock in the court's construction may be attributed to the abundance of basalt boulders in the area. Domestic structures were also unusual, lacking entryways, firepits, and interior posthole patterns (Wasley and Johnson 1965; Schroeder 1967).

In reviewing the report of Wasley and Johnson (1965), Schroeder (1967) argues that the evidence of the Rock Ball Court Site was misinterpreted and proposes that the site represents a "Hakatayan" (Patayan or Yuman) occupation. According to Schroeder, "the only traits at this site usually assignable to the Hohokam are the bastard ballcourt, 622 Gila Butte Red-on-buff (possibly intrusive) sherds, and a couple of carved-shell objects" (1967:3). Other traits (oval house structures, rock-cleared use areas, cremations, percussion choppers, two-hand manos, pestles, and possible stone vessels) are described as Hakatayan exclusively or as equally characteristic of Hohokam and Hakatayan complexes. This commonality of material culture can be substantiated in the case of the rock-cleared use areas, which represent a trait that is undoubtedly shared by all ethnic groups occupying areas heavily covered with rocks, as are large portions of the terraces of the Gila River at Painted Rock. The arguments presented regarding other traits are of interest chiefly as indications that the people of the Gila Bend area differed in minor aspects of material culture from the people of the central Salt-Gila area.

Schroeder's (1967:3) argument that the Rock Ball Court Site may have been "Hakatayan" or Patayan is not convincing. If Hohokam decorated wares are intrusive here, as Schroeder (1967) has proposed, then they are evidence of well-established, substantial exchange with the Hohokam of the Salt-Gila. On the other hand, if they were produced locally, they represent evidence of a shared aspect of material culture that, in combination with other factors, among them the appearance of irrigation, is also suggestive of increasing integration of the people of the Gila

Bend area within the regional system. Thus, the question of the source of these decorated ceramics is relevant to a consideration of the mechanisms of this integration; it cannot, however, be resolved in favor of a Colonial Period Gila Bend society for which the Hohokam of the central Salt-Gila area were irrelevant or unimportant.

During the Colonial Period, trade routes were developing. At least one of these routes seems to have involved transport through the Growler Mountains to the central Salt-Gila area. The Gila Bend area straddles the route along which these goods would have been carried to the Hohokam or populations in other areas to the north and east. The sites associated with these routes (Lost City, Charley Bell Well) have typically Hohokam assemblages. It is possible that the people of the Gila Bend area were involved in this trade, which would have strengthened their ties with the Hohokam of other areas and encouraged some forms of imitative social, economic, and technological patterning.

Sedentary Period

During the Sedentary period, patterns of settlement and material culture in the Gila Bend area resembled patterns in the central Hohokam area more closely than at any other time. The practice of irrigation became widespread, and the foothill villages apparently were abandoned. Evidence suggests these developments were accompanied by aggregation and development of a more elaborate sociopolitical hierarchy. The Citrus Site pattern of plaza and associated houses, comparable to the clustered house patterns noted by Wilcox (1979:113) at Snaketown, is a notable example of this evidence, as is the unusually early platform mound at the Gatlin Site.

There is some evidence of economic differentiation on an inter-village scale during the Sedentary Period. In recent conversations, Norton Allen, whose interest in the archaeology of this area has spanned several decades, has indicated that distinct differences in the quantity and quality of burial ceramics exist between habitation sites. At some of these sites, a consistent pattern of single or even fragmentary plain ware vessels in association with cremations has been noted. Without more detailed information, it is not possible to determine whether this differentiation indeed represents major economic differences between villages or some smaller-scale phenomenon. Wilcox, in a recent conversation, has suggested that this evidence of economic differentiation could reflect the presence of only a few families in a relatively small, impoverished "hamlet."

Also noteworthy is the presence of a relatively late Snaketown ballcourt at the Citrus Site. If Wilcox (1979) is correct in proposing that these structures were foci of redistributive activity that encompassed a number of villages, the presence of this ballcourt is suggestive of a better-developed, irrigation-based community in which the redistribution of goods was a centralized activity.

Perhaps the single most significant consideration is the presence of a platform mound at the Gatlin Site which apparently was constructed during the early Sacaton Phase. Whatever political, social, or religious importance mounds may have had to the Hohokam (indeed, these aspects of importance are often inseparable in preindustrial societies), they are believed to have been associated with some form of centralization of authority. Wasley and Johnson (1965:51) state that the Gatlin Site, believed to have been only sparsely inhabited, "suggested the possibility that the Hohokam settlement pattern may have included centers that were primarily ceremonial, perhaps in a manner analogous to the patterns of Mesoamerica."

This interpretation has often been regarded as questionable, given other information regarding the level of development achieved by the Hohokam. It is rendered even less probable by the presence of pit house remains in a road cut now existing south of the platform mound and by the quantities of domestic trash visible at the site. Nevertheless, the apparent centrality of the feature, and consequently of the site of which it is a part, is obvious. What accounts for this evidence of a more complex, intervillage hierarchy?

Wilcox (1979) suggests that the centralization presumably represented by the Gatlin Site platform mound may reflect a social system that was capable of exercising tribute demands on neighboring areas, and that such demands may have served, in part, to fulfill the needs generated by population growth and by increased competition among large villages for prestige and for irrigation labor. The Gila Bend population, however, because of its location at the western periphery of the Hohokam area, was in a poor position to extract either agricultural produce or labor from adjacent areas that were politically or socially less developed. The Papaguería was relatively unproductive and, apparently, sparsely populated. Furthermore, canal systems reported in the area do not seem disproportionate to the apparent population density at that time. Both population and irrigation seem to have increased significantly during the Sedentary Period, but any need for additional labor presumably could have been met through the normal flow of labor to economically expanding areas, a process that has been frequently documented by geographers (see Keeble 1967:259), rather than through coercion.

One might also suggest that centralization would have served as a means of controlling competition for agricultural land. There is, however, no supporting evidence of attempts to expand the land available for agriculture through use of alternative environments or strategies, which might be expected if there were significant shortages.

The development of centralization to meet the need for hierarchical authority to administer irrigation systems might also be proposed. The advantages of some systematic mechanism of intervillage cooperation for this purpose may indeed have been an inducement to increased centralization, but is not a sufficient explanation. Southwestern groups of the historic period demonstrated that systems could be controlled without strong central authority. More to the point, contemporaneous Hohokam

communities in the central Salt-Gila area apparently did not require the centralization represented by a platform mound for the management of their equally extensive systems.

Explanations that include reference to networks of communication and exchange of goods seem more satisfactory than do those that ignore these factors. Involvement in regional exchange would have provided greater potential for the concentration of goods and status, and would have been unlikely to involve all segments of the community, or all communities, equally.

It is not unreasonable to suppose that the scale represented by the quantities of shell and other exotics in Sedentary Period Hohokam sites would have required organization and some degree of specialization. The need for specialization might have been increased by the importance of the labor-intensive agricultural subsistence base; the need for labor to maintain irrigation systems would have limited the ability of many individuals within the community to participate in other economic pursuits.

Centralization would have been further encouraged if some of the commodities exchanged assumed continuing importance to the local community. Beyond the obvious use of items like shell as indicators of class or status, the Sedentary Period population of Gila Bend may have relied on trade for some portion of their subsistence.

According to Wilcox (1979), the widespread growth of dry farming within the Hohokam regional system at this time indicates that resource requirements were growing and could not be met by irrigation agriculture alone. In the Gila Bend area, however, a more diversified subsistence base (represented by the upland sites) seems to have been abandoned by the end of the Colonial Period. There is no known evidence of its having been resurrected or of alternative strategies having been adopted, although the area experienced the same apparent population growth that occurred elsewhere. Quite possibly, these different developments are related to one another as expressions, in part, of the regional economic system rather than as local responses to population resource requirements.

The people of the Gila Bend area may have relied on trade to meet resource needs beyond those satisfied by local irrigation agriculture. This would have encouraged centralization of authority, since redistribution of the products received would have been important to all of the population rather than simply to an elite. Furthermore, organization of the trade would in itself have made more desirable the efficiency that centralization provides.

Although there is little direct evidence of the important of basic commodities to the Gila Bend area, the presence of beans (*Phaseolus metcalfei*) in Classic Period Tanque Verde Phase cremations at *Fortified Hill* at least suggests the existence of such trade. Nabhan (1980) has noted that the distribution of this species does not, at present, extend to within 125 km of Gila Bend. While it is possible that their natural

distribution may have been quite different prehistorically, it is somewhat more probable that these beans were imported from elsewhere. Reservations must be noted, however, with respect to the context of these specimens. Their presence in cremations may denote some specialized significance and warrants some caution in forming interpretations relating to their importance as a subsistence commodity. Furthermore, these specimens were recovered from very late contexts relative to the period under discussion here.

It can nonetheless be demonstrated that the Sedentary Period witnessed the height of activity along the trade route represented by the Lost City and Charley Bell Well sites. During this time, the Gila Bend area may have been a key to the central Salt-Gila area's access to shell and, possibly, other items. Flourishing trade elements within the economy would have encouraged the survival of the Snaketown-style ball-court if, as Wilcox suggests, such courts did indeed serve as locations for trade fairs or other redistributive functions. If traders from the Gila Bend area brought commodities to that area for purchase or transported them elsewhere for exchange, they might have received agricultural produce in return. It should be noted, however, that an exchange of this kind would have placed increased demands upon the agricultural resources of the producing areas.

This raises the question of the relationship of economic and agricultural changes in the central Salt-Gila area to developments in the Gila Bend area. The expansion of agricultural activities into impermanent drainages during the Colonial Period has been noted. This expansion has most commonly been explained in terms of population pressure, but was only one of several strategies that might have been adopted in response to this problem. Furthermore, no compelling argument for the existence of any substantial pressure of this kind during the Colonial and Sedentary Periods has yet been advanced. Why, then, the expansion, and what were its effects?

One obvious advantage in a strategy of agricultural expansion is greater diversity and, consequently, greater overall reliability of supply. Doelle (1979), however, points out that major impermanent streams would have supported only one crop a year, unlike permanent streams, which could have been expected to yield two crops a year. While some areas may have been farmed only in good years by groups that normally resided in the riverine villages, archaeological evidence has been discovered along larger, impermanent drainages, of villages that seem to have been sites of relatively stable occupations. The concept of permanent versus impermanent habitation is too simple to be successfully applied in the patterns characteristic of many agricultural populations; even if not occupied consistently on a year-round basis, these sites nonetheless suggest continuity and stability.

Continuity of occupation is not necessarily paralleled by stability of agricultural production, however, and villages situated in impermanent drainages could have been at an economic disadvantage compared

to those situated in riverine environments. Greater use of wild resources would have compensated to some extent for low agricultural production. However, wild resources would have been hardest to exploit in the drier years that would have proved most difficult for agriculture. The redistribution of commodities from riverine areas during lean years could have played a part in meeting the subsistence needs of populations living in these areas.

Given these considerations, it is possible that one impetus for expansion into less productive areas might have been the increased potential for surplus during normal and better-than-average years. The population (in both areas) could not for any extended period have exceeded that which could be supported during the less favorable years. Thus, the normal condition may have been one of surplus rather than mere sufficiency, and the use of this surplus might have been as a resource for exchange.

Such reasoning assumes a close relationship between riverine and nonriverine villages in the central Salt-Gila area. The likelihood that nonriverine villages would have been periodically economically dependent upon the riverine groups would have encouraged such a relationship. This dependence would have, in turn, encouraged the development of increased status differentiation and of social and economic networks, incorporating a number of villages. Such networks would have permitted the production and distribution of commodities for regional exchange. This reconstruction, though admittedly quite speculative, would account in part for the development of economic and social complexity in both the central Salt-Gila and Gila Bend areas.

This reconstruction also provides an alternative to Wilcox's (1979:114) proposal that the construction of platform mounds reflected the need to centralize authority in order to maintain the consolidated canals systems believed to have existed along the central Gila during the Classic Period. While the initial construction date of the Gatlin mound is in some question, it certainly predates the Classic Period and would have involved an unparalleled community effort in planning ahead, as well as substantial irony given the absence of any evidence for use of canals at Gila Bend during the Classic Period.

The impetus for construction of these platform mounds must be sought in the Sedentary Period, and in conditions presumed to have existed at a relatively earlier time in the Gila Bend area than in much of the central Salt-Gila. Centralization as a response to increasing exchange of goods has been suggested as a reasonable reconstruction of Sedentary Period development in the Gila Bend area.

In interpreting the Sedentary Period developments in the Gila Bend area, however, consideration must also be given to relationships other than those with the Hohokam of the central Salt-Gila area. During the Sedentary Period, the first significant numbers of Lower Colorado Buff Ware ceramics, associated with the Patayan or Yuman culture complex, appear in the Gila Bend area. The ceramic assemblages of several sites

are largely composed of Lower Colorado Buff Wares in association with some local Hohokam wares. Two such sites located in the western portion of the Painted Rock Reservoir were excavated by Wasley and Johnson (1965); these sites may represent small, relatively short-term habitations, possibly associated with farming.

Lower Colorado ceramics are also found at sites with predominantly Hohokam assemblages, such as the Gatlin Site. This suggests a developing system of exchange and communication between Patayan and Hohokam populations and limited, rather than large-scale, movement of people into the Gila Bend area from the west during the Sedentary Period.

If trade is perceived as an important element in the strategy adopted by the population of the Gila Bend area for meeting Sedentary Period resource needs, the Patayan presence is more easily explained. It does not seem likely that Patayan groups would have been encouraged to use valuable agricultural land unless there was some compensating advantage to the local population. Nor does it seem probable that, at the height of their social and economic development, the local population would have been unable to prevent settlement by other groups if such action seemed desirable. Apparently, the Patayan presence did not significantly reduce the local population's access to valuable resources, at least not to an unacceptable extent. Benefits from a trading relationship might have been one reason for Patayan cultivation of agricultural lands to have been viewed as acceptable. The Lago Seco Site north of the Crater Mountains (Huckell 1979) is a Patayan I site that dates to this period and was apparently associated with shell trade. It may also be evidence of a developing trade relationship between Hohokam and Patayan populations. The presence of Sacaton Red-on-buff at the site confirms that its occupants had some contact with the Hohokam.

As Huckell (1979:134) notes, the evidence of trade relationships at this site must be reconciled with the presence of identifiably Hohokam shell trade and manufacture centers such as AZ Y:16:1, the Lost City Site in the southern Growler Valley. This is not particularly troublesome if one recognizes that prehistoric exchange networks are unlikely to have involved monopolies but could have been composed of multiple independent or only loosely related elements.

Also of interest in this regard is Huckell's (1979:134) attributing of the pronounced discontinuity between assemblages identified as Patayan I and II (including the absence of Patayan I red wares from Patayan II assemblages) to a possible change in populations rather than to change within a single group. He proposes a possible northwestern Mexican origin for Patayan I groups, while noting that subsequent Patayan II and III material culture shows sufficient continuity with that of the historic Yumans to support the contention that the Patayan people were ancestors of the historic groups.

A final, relevant aspect of regional Sedentary Period developments should be reviewed. Withers (1941) developed a Papaguerían culture-historical sequence on the basis of his work at Valshni Village, using ceramic cross-dating to establish absolute dates. The Vamori Phase (A.D. 800-900) is very sparsely represented and has been investigated only at Valshni Village. The Sedentary Period Topawa Phase (A.D. 900-1100) and the Vamori Phase ceramics include red wares, a tradition continued in the Sells Red ceramic type that characterizes the succeeding Sells Phase (A.D. 1100-1450). The presence of red wares in the Patayan I ceramic assemblage concurrently with their appearance in the Papaguería immediately to the south is interesting in that it suggests the appearance of a southern phenomenon that may have involved the interaction of ethnically diverse groups and the influence of Patayan groups on other populations in this area.

The implications of such interaction for the Gila Bend area are significant. In effect, it would mean that, rather than coming into contact with a few representatives of the Yuman cultural group (as Wasley and Johnson proposed), the people of the Gila Bend area interacted regularly with several important regional systems during the Sedentary Period. Since there is evidence that Patayan or Yuman groups were involved in significant levels of trade for the first time during the Sedentary Period, this implies a shift in the role of peripheral Hohokam populations like the one in the Gila Bend area. If trade was a major factor in integrating the people of the Gila Bend area within the Hohokam system, then this economic relationship must have changed and, in turn, effected other changes within the local society. If the increasing participation of people to the south led to increased efficiency in the movement of goods, then the economy of the Gila Bend area might have been strengthened as the people of this area assumed increased importance as "brokers" of these goods. If the effect was one of increased competition, then it could have resulted in the weakening of the local economic base and, consequently, of the local society as a whole.

Several lines of evidence can be brought to bear on this issue. Many of the known Hohokam (Rosenthal and others 1978; McGuire and Mayro 1978) and Patayan (Huckell 1979) shell-trade sites known at present are located in areas south of the Gila Bend area; thus, routes intersecting the Gila in this area would have been among the most efficient possible. The occurrence of Patayan I sites and ceramics in the area confirms that it was not, in fact, in cultural isolation.

Trade may have provided benefits that reduced the need for expansion of agricultural strategies by the local Hohokam population, although it could at best have served only to supplement the existing agricultural subsistence base. The Patayan presence in this area during the Sedentary Period may have been made desirable to the local population by this beneficial economic relationship. The converse would have been true had the Patayan role in regional exchange networks been one of competition with the Hohokam.

Classic Period

During the Classic Period, there was a radical shift in regional relationships, coinciding with a decrease in the appearance of exotic goods in the central Salt-Gila area. Haury (1976:347-348) notes that, by A.D. 1200, the Hohokam culture had climaxed and was in decline. Without attempting to deal with all of the implications of this statement, it is possible to accept the idea of a significantly altered regional influence.

The Classic Period Hohokam sites in the Gila Bend area do not exhibit attributes characteristic of sites of the same date in the central Salt-Gila area. While the central Salt-Gila populations developed above-ground architecture and other distinctive characteristics, at Gila Bend the pit house continues as the normal domestic structure. The dominant decorated ceramics of this period are Tanque Verde Red-on-brown (characteristic of the Tucson Basin and distributed widely throughout the Papaguería and as far east as the San Pedro River) and Trincheras types. It is noteworthy that the plain wares associated with the Trincheras and Tanque Verde ceramics again include the Gila Plain, Gila Bend variety characteristic of the area throughout its history.

No evidence of irrigation agriculture in the Gila Bend area during the Classic Period has been reported. Canals do not seem to be associated with Classic Period sites, which are typically located in lower elevations where floodwater agriculture was possible. A conspicuous exception is the Fortified Hill Site. This site's function may not have been defensive, but its location and assemblage suggest no other satisfactory explanation.

While Schroeder (1967) argues that the Classic Period sites identified as Hohokam by Wasley and Johnson (1965) are not Hohokam but "Hakatayan," his argument is not convincing. He relies heavily, as in his remarks on the Colonial Period, on the assumption that the locally produced plain wares are not a variant of Gila Plain but are a Lower Colorado Buff Ware. While further study is needed to resolve questions of ceramic identities in this area, a more elegant explanation of the new phenomenon focuses upon a shift in regional relationships involving the same local population present in the Gila Bend area previously. This explanation is made even more probable by the presence of two distinct culture patterns in the area at this time, one of them the Patayan II. If both populations were "Yuman," greater homogeneity than has been observed might be expected.

A shift in local affiliations seems consistent with events throughout the Hohokam regional system at this time. The area in which the transition to a southern/Trincheras ceramic tradition occurred is extensive. It is certainly relevant that, during the early Classic Period (Soho Phase), trade into the central Hohokam area seems to have been significantly reduced (Doyel 1977). Nevertheless, the sites associated with the trade system survived.

Sites like AZ Y:16:1 (Lost City; Fontana 1965:61-69) and those at Stoa Pitk (McGuire and Mayro 1978) share with those of the Gila Bend area the Classic Period occurrence of Tanque Verde Red-on-brown and Trinchera ceramics, suggesting that the population of the Gila Bend area maintained a relationship with the groups that transported shell and any other commodities that were traded. What relationship with the exchange network itself the populations of the Gila Bend area may have retained is less clear. There is evidence that the people of the Papaguería participated in this network (Rosenthal and others 1978:222), which further complicates the history of trade relationships in the region. Rathje and others (1978:164) have discussed the effects of the spread of economic growth, and of the consequent increase in groups "filtering" trade goods, on central trading areas. These effects include decreased economic efficiency and a general lessening of economic centralization.

There is little evidence of a Hohokam population in the Gila Bend area during the later phases of the Classic Period. During the Historic Period, the population was Yuman. It is likely the integration of people from the Gila Bend area with people to the south occurred during the middle to late Classic Period.

What accounts for this shift in regional relationships? Wilcox has stated that:

> The evidence for social differentiation at Snaketown...indicates the presence of a social organization that may be capable of operating a tribute system.... Similar evidence [the platform mound at the Gatlin Site (Wasley 1960) and the plaza surrounded by small houses at the Citrus Site] is present in the Gila Bend area where large-scale irrigation was practiced in the Sedentary Period (Wasley and Johnson 1965)....
>
> The effort to retain its centrality of position may thus account for the initial emergence of social differentiation among Gila-Salt populations and probably at Gila Bend too. Such differentiation among neighboring groups, according to this line of thinking, was first a product of the tribute system and later a result of the struggle against that domination. Conflict and increasing warfare are indicated. The result, by the end of the Sedentary Period, was the abandonment of the Gila Bend communities (Wasley and Johnson 1965) and the collapse of the Hohokam regional system (1979:113).

It has been noted in the discussion of the Sedentary Period that alternative reconstructions, which do not necessarily entail a system of tribute, are also consistent with the available data. It has been argued that symmetrical exchange networks would both permit and benefit from the emergence of social differentiation. Hohokam loss of a central role in regional trade would have affected all parts of the system, most conspicuously those on the periphery that might have been most dependent on trade to provide economic benefits and social cohesion.

The concept of environmental stress putting significant strains on Hohokam agriculture during the Classic Period is now common. In the Gila Bend area, the resulting disruption may well have been more decisive than elsewhere since there is, at present, no evidence of agricultural diversification during the preceding Sedentary Period. The floodwater farming apparently practiced in this area during the Classic Period would have provided rather unsatisfactory compensation.

A Preclassic Period trade in agricultural produce would have provided the people of the Papaguería, northern Mexico, and other desert areas the goods to which they had the least independent access and which the people of the central Salt-Gila area had the greatest ability to produce. If the populations of the Gila Bend area during the early Classic Period found themselves with a reduced ability to indepedently produce agricultural surpluses and were not obtaining needed commidities from the central Salt-Gila area, much of the basis of their relationship with that area would have deteriorated, as would their role as "brokers" in a regional trade network. These factors account for changes in this area much better than does a "struggle against domination." There is no evidence of coercive power capable of supporting such domination within the Hohokam system at any time. That the tribute relationship would have been initially beneficial to both parties and then increasingly demanding on the subordinate communities is not impossible, but there is no mechanism to explain the desirability of a regional, unidirectional flow of goods even during the earliest period for which this is proposed. Supposedly "subordinate" areas could have benefited instead from two-way regional exchange as a means of gaining access to goods not commonly available in the immediate area and, in general, of ensuring a more stable economic situation.

In the case of the Gila Bend area, Wilcox's statement that Wasley and Johnson (1965) proposed "the abandonment of the Gila Bend communities" at the end of the Sedentary Period, when, in fact, they had noted only a change in village distribution to one emphasizing floodplain locations where floodwater farming was possible, confuses the issue. Schroeder (1967) did indeed propose that the Gila Bend area was abandoned by the Hohokam at that time, but the concept of changing regional alliances on the part of a basically identical population is more convincing. This shifting of affiliation can be accounted for by a shifting of economic relationships if factors like reduced availability of goods for exchange in the central Salt-Gila area (resulting from decreased availability of agricultural products needed by the people to the south) reduced the interaction of the Gila Bend populations with those of the central Salt-Gila. Disruption of regional patterns of trade and communication could account, therefore, for the lack of participation in the Hohokam regional system by groups living in peripheral areas. This does not assume, as does Weaver's (1972:47) model, a "depopulation" of peripheral areas, but rather a shift in economic and social ties on the part of groups in these areas.

A similar pattern could be expected if a move to greater aggregation in riverine environments were caused by factors other than increased aridity. Consideration must be given to the possibility that the changes might have been culturally rather than naturally induced.

This reconstruction might account for the developments of the early Classic Period in terms more convincing than a response to excessive tribute demands. Conflict could arise (and the evidence suggests it did) from competitiveness within a system previously bound rigidly by the need for cooperation. The regional system would have been of an economic rather than political nature, although political alliance might be a predictable outgrowth of economic interdependence. A breakdown in economic cooperation would have been sufficient to precipitate conflict at some level.

The cooperation apparent in relationships between Patayan and Hohokam populations during the Sedentary Period does not appear to foreshadow serious difficulty between those two groups. Examination of ceramics of this period from the Fortified Hill Site in the collections of the Arizona State Museum shows the co-occurrence of Patayan types and local Hohokam ceramics, which suggest continued communication and exchange.

There is even less reason to suppose that the people of the Gila Bend area were in conflict with those of the Papaguería and of the Tucson Basin; these are the groups with whom they seem to have interacted most closely during the Classic Period. It is during the Classic Period that the sites of the Quitojoa Valley suggest that there were additional participants in the shell-exchange network (Rosenthal and others 1978). An elaboration of the supply system during a time when traditional customers were in decline seems somewhat paradoxical, but is understandable if alternative social and economic systems are considered. Wilcox (1979) has noted that political and economic alliances possibly opposed to the Salt-Gila groups during the Soho (Sells) Phase of the Classic Period may include that typified by the presence of Tanque Verde Red-on-brown, whose distribution extends from Gila Bend to the San Pedro River, as well as the Salado and Sinagua.

Conflict with the central Hohokam is another possibility, but the possible sources of such conflict are difficult to uncover. The presumed inability of these people to trade for goods in the quantities typical of earlier periods, while perhaps accounting for a loosening of economic and social ties, suggests little ground for conflict. Although the people of the central Salt-Gila area might have tried to obtain by coercion what was no longer readily available through trade, the most conspicuous northward-moving commidity--shell--does not seem a resource sufficiently crucial to have justified such an expenditure of energy by a society already hard-pressed economically.

The possibility that conflict may have involved widespread but individually localized competition for resources seems most probable given these considerations. Such competition may occur on virtually

any scale. An example of very localized defensive behavior in an agricultural and mercantile economy is provided by Chan (1978:45) in his discussion of Contact and Colonial Period Yucatan. The barrio, or neighborhood, was the smallest political unit within the community; barrios were sometimes fortified for defense. Localized conflict can, therefore, occur even within communities. It is not difficult to suppose that, among the prehistoric people of southern Arizona, individual villages and communities might have been in conflict with one another.

Research Questions: The Painted Rock Reservoir Sites in the Context of Gila Bend Area Prehistory

AZ Z:1:7 and AZ Z:1:8

The problem at hand is one of determining the extent to which data acquired during the course of very limited excavations at AZ Z:1:7 and AZ Z:1:8 can contribute to an examination of the model of Gila Bend area prehistory that has been presented. The excavations conducted during the summer of 1978 are, in this respect, strongly reminiscent of earlier work in the same area:

> The Painted Rocks Reservoir salvage project was welcomed as an opportunity to gain more knowledge about broad settlement patterns and specific village plans of the Hohokam culture. Yet in spite of a conscious effort to achieve this goal, the results were disappointing in several respects. A large portion of some of the sites had been destroyed by erosion or by modern agricultural expansion. A prohibitive expense would have been involved in the thorough investigation of some of the other sites. Nevertheless, some valuable data on settlement patterns were obtained (Wasley and Johnson 1965:79).

While the excavation conducted in 1978 offered no potential for the definition of broad settlement patterns, other hopes, including some for assessments related to village plan, were not fulfilled. Nevertheless, these excavations may help to clarify some of the issues involved in the interpretation of the prehistory of this area.

The time periods represented at these sites include the Santa Cruz Phase (A.D. 700-900) of the Colonial Period and the Sacaton Phase (A.D. 900-1100) of the Sedentary Period. AZ Z:1:7 was originally recorded as evidencing Colonial and Sedentary Period occupation. AZ Z:1:8 is predominantly of Sedentary Period age.

Both sites appear to have been secondary villages as these are normally defined. Neither is believed to have had a ballcourt, and the Gatlin Site contains the only platform mound in the area. This is not conclusive, however, because even at the time of earlier surveys

portions of the sites were disturbed. Ballcourts may have been destroyed or surface evidence of their existence obliterated.

The concept of the secondary village as a component in the "irrigation community" implies a lower level or absence of central social, political, or religious functions in the secondary settlement. These functions are associated with primary villages, which are normally identified by the presence of ballcourts. The sites closest to AZ Z:1:7 and AZ Z:1:8 that are known to have had ballcourts are the Gatlin Site, 8 km to the east, and the Citrus Site, 8 km to the northwest. The Citrus Site dates exclusively to the Sacaton Phase. The Gatlin Site, like AZ Z:1:7 and 8, dates to the Santa Cruz and Sacaton Phases; Wasley and Johnson (1965:15) indicate that the construction of Ballcourt 1 at this site dates to the earlier phase. If AZ Z:1:7 and 8 may be recorded as secondary villages, it is reasonable to assume that the primary village to which they were related was the Gatlin Site. In light of the limited information on sites of this kind in the Gila Bend area--in fact, in the Hohokam area as a whole, the information that may be provided by sites like AZ Z:1:7 and 8 is of particular interest.

A number of research questions based on the aforementioned premises were developed before beginning fieldwork at AZ Z:1:8. (AZ Z:1:7 was originally not believed to lie in an area of direct impact; accordingly, no research questions were designed specifically for work at that site.) These questions were, by intention, extraordinarily ambitious given the very limited scope of the project. They will be reviewed in order to reevaluate the potential for addressing them in the study. Additional approaches will also be proposed.

Pre-Excavation Research Questions

1. The plaza-oriented village organization of the Citrus Site dates to the Sacaton Phase. This seems to represent a significant change from the dispersed ranchería pattern. Is this type of organization characteristic of:

   - primary villages of the Sacaton Phase?

   - later villages, whether primary or secondary, of the Sacaton Phase?

   - only later Sacaton Phase primary villages?

   For the purposes of evaluating these questions, the following questions should be addressed during excavations at AZ Z:1:8:

   1) During the Sacaton Phase, was the village organized in a dispersed or plaza-oriented manner?

2) What is the date of the Sacaton Phase occupation at the site?

3) Is there a ballcourt at the site? If so, to which period does it date?

These questions cannot be resolved on the basis of information currently available. No structures believed to date to the Sacaton Phase were identified in the area.

II. The nature of the relationship of Yuman populations with the Hohokam of the study area has been debated. It is thought that there was no Colonial Period contact between these groups (Wasley and Johnson 1965). The nature of Sedentary Period contact between them is uncertain, but may have involved:

- trade, throughout that period or only during the late Sacaton Phase;

- coexisting communities, throughout the period or only during the late Sacaton Phase, that used different resource areas;

- conflict, with competition for specific resource areas.

The following questions should be addressed during excavations at AZ Z:1:8:

4) Are Lower Colorado Buff Wares present in association with Hohokam habitation features? Are such wares present in Hohokam burial contexts?

5) What are the dates of any such Hohokam/Yuman associations?

These questions can be addressed in this study, although the contexts cited for particular attention are unavailable for the Sacaton Phase. Analysis of ceramics from both AZ Z:1:7 and 8 can provide information on the frequency with which Patayan or Yuman ceramics occur in secondary village context. The relative frequencies of these types here and at the Gatlin Site, a primary village, can then be compared.

III. The relationship between "peripheral" and "core" Hohokam areas has been a question of particular concern. Wilcox (1979) has suggested that tribute moved from peripheral areas into the Salt-Gila core area during the late Sedentary Period. More often, trade and exchange networks have been suggested as important elements in the Preclassic Period Hohokam economy.

The following question should be addressed during excavations at AZ Z:1:8:

6) What types of exotic goods are present in Colonial and/or Sedentary Period contexts? Ceramic types and ornamental objects are especially likely to be significant. A tribute relationship would presumably be evidenced by a very few relatively specialized exotic goods from the Salt-Gila area or elsewhere in even a quite substantial secondary village in a peripheral area. The flow of goods would have been predominantly outward rather than inward. Complex trade and exchange could be expected to have brought greater returns to productive agricultural villages.

This proposition as stated evaluates only a possible relationship wherein the Gila Bend area enjoyed a role secondary to the central Salt-Gila area. It does not consider the possibility that the Gila Bend area might have dominated other areas. Furthermore, this statement does not consider the range of possibilities associated with a trading relationship. The proposition can be restated and considered.

IV. Possible status-related differences in the quantity and kinds of burial goods have been suggested for the Sedentary Period, with burials identified as "high status" concentrated in the major villages (Doyel 1977). Change in cremation style during the late Sacaton Phase has been noted, with a transition from simple pit cremation to interment in pots. If this change is simply a factor of time, it would be expected in any late Sacaton Phase context. If, on the other hand, interment is an indicator of status, it is unlikely to occur in a secondary village, given its relative rarity (only one instance at the Citrus Site) even in those primary villages that have been excavated. Therefore, it should be determined:

7) What form of cremation is present at AZ Z:1:8 during the various phases of occupation? What burial goods are associated with those cremations?

No burials of any kind were discovered at AZ Z:1:8.

V. The Pioneer Period has been a source of controversy with respect to its actual dates, the source of the irrigation agriculture technology employed during the period, and even the identification of the occupation during this period as "Hohokam". Questions to be addressed at AZ Z:1:8 include:

8) Is there a definable Pioneer Period occupation at the site? If so,

9) During what part of the Pioneer Period was this location in use?

10) Was this a habitation site or a specialized-use site?

If AZ Z:1:8 was in use as a locus of habitation, then the practice of irrigation is indicated by the site's location away from the Gila in a terrace setting.

No apparent evidence of Pioneer Period occupation was discovered at AZ Z:1:8. Although ceramics of this period have been reported from the site, none were observed during the course of work there.

Reassessment

From the preceding discussion, it can be determined that examination of data from AZ Z:1:7 and 8 can be most productively focused on the question of relationships that occupants of those sites maintained with other groups during the Santa Cruz and Sacaton Phases. Furthermore, these data present an opportunity to reexamine the controversial issues surrounding the ceramics of the Gila Bend area.

The relative frequencies of imported ceramics from various Santa Cruz and Sacaton Phase contexts at these secondary villages will be determined and compared to those at the Gatlin Site. The frequencies of finished-shell and shell-manufacturing debris will also be evaluated and compared to those at that site. Studies of animal bone, flotation samples, and pollen samples may be useful in evaluating both localized activity areas and the overall subsistence base.

Comparative analysis of ceramics from these sites and from others constitutes an important element in this study. In particular, petrographic analysis of plain wares from these sites, from collections typed by Schroeder and by Wasley and Johnson, from the Javelina Mountain sites, and from a Classic Period site in the area can provide information that has been long awaited. Petrographic analysis will also assist in evaluating whether decorated wares were, in fact, locally produced or imported.

By comparing the results of this analysis with the expectations generated by the preceding discussion, a contribution may be made to our understanding of events in the Gila Bend area and their implications for the Hohokam regional system.

AZ S:16:36

This site is related to those described as "rock circle sites" by Teague and Baldwin (1978). This vague designation reflects the current absence of any acceptable data regarding the age, cultural affiliation, or function of these sites. The test excavations conducted at AZ S:16:36 were welcomed as an opportunity to evaluate the place that this site and others like it may have in the study of the prehistory of the Gila Bend area.

Test excavations were undertaken at this site with several objectives in mind. It was hoped that absolute dates for the site could be obtained through analysis of archaeomagnetic or radiocarbon samples. Excavation inside and outside the rock circles was proposed as a means of testing the assumption that these features represent the bases of structures utilized for short periods of time and of recovering artifacts that might be of help in interpreting site activities and age. It was further hoped that palynological and other botanical samples could be obtained in order to help determine site function and to evaluate the possibility that food or other botanical material was stored at the site.

CHAPTER 3

THE SITES

AZ Z:1:7 and AZ Z:1:8

AZ Z:1:7 and AZ Z:1:8 were first reported by Schroeder in his report of a survey in the Painted Rock Reservoir (1961) and, subsequently, in the report of a more recent survey in the area by Teague and Baldwin (1978). Schroeder described the sites as large Hohokam villages and listed an artifact assemblage with the functionally diverse character expected of permanent habitation sites (1961:10), including several varieties of worked and unworked shell, ground stone, flaked stone, and ceramics. The presence of trash mounds, cremations, and hearths was also noted. Ceramics were identified as Gila Butte, Santa Cruz, and Sacaton Red-on-buff, Gila Plain, and Gila Plain polished, with limited quantities of Lower Colorado Buff Wares (Gila Bend Plain, Palomas Beige, and Palomas Buff) and a single sherd of Cibola White Ware.

While initially it was thought that only AZ Z:1:8 would be affected by development, it was found during testing that two major areas of artifact concentration were present, one apparently representing AZ Z:1:8 and the other, to the southeast, possibly associated with AZ Z:1:7 (see Figure 2). While the main portion of AZ Z:1:7 is located east of the area tested and is separated from the study area by a dirt road, the southeastern artifact concentrations were closer to the central portion of AZ Z:1:7 than to AZ Z:1:8. Areas of low artifact density and a wash intervened between the areas designated by the different site numbers.

The condition of the sites was poor. Portions of AZ Z:1:8 had been bladed, and much of the area had been in use earlier for agriculture. Although this earlier work had not entailed leveling of the area, John Laird of Gila Bend indicated that trash mounds that had been identifiable at the time of earlier Painted Rock Reservoir work had been destroyed. Nevertheless, it was found that subsurface features were often intact or only partially disturbed. The surface distributions of artifacts were sufficiently discrete to suggest that, while their distribution may have been altered to some extent, the larger clusters may be regarded as representing single features with some valid archaeological association. The portion of AZ Z:1:7 east of the road (not investigated during the testing) is now being subjected to very severe vandalism. Recent change in the flood-release schedule of the U.S. Army Corps of Engineers has caused the sites to be inundated since the completion of testing.

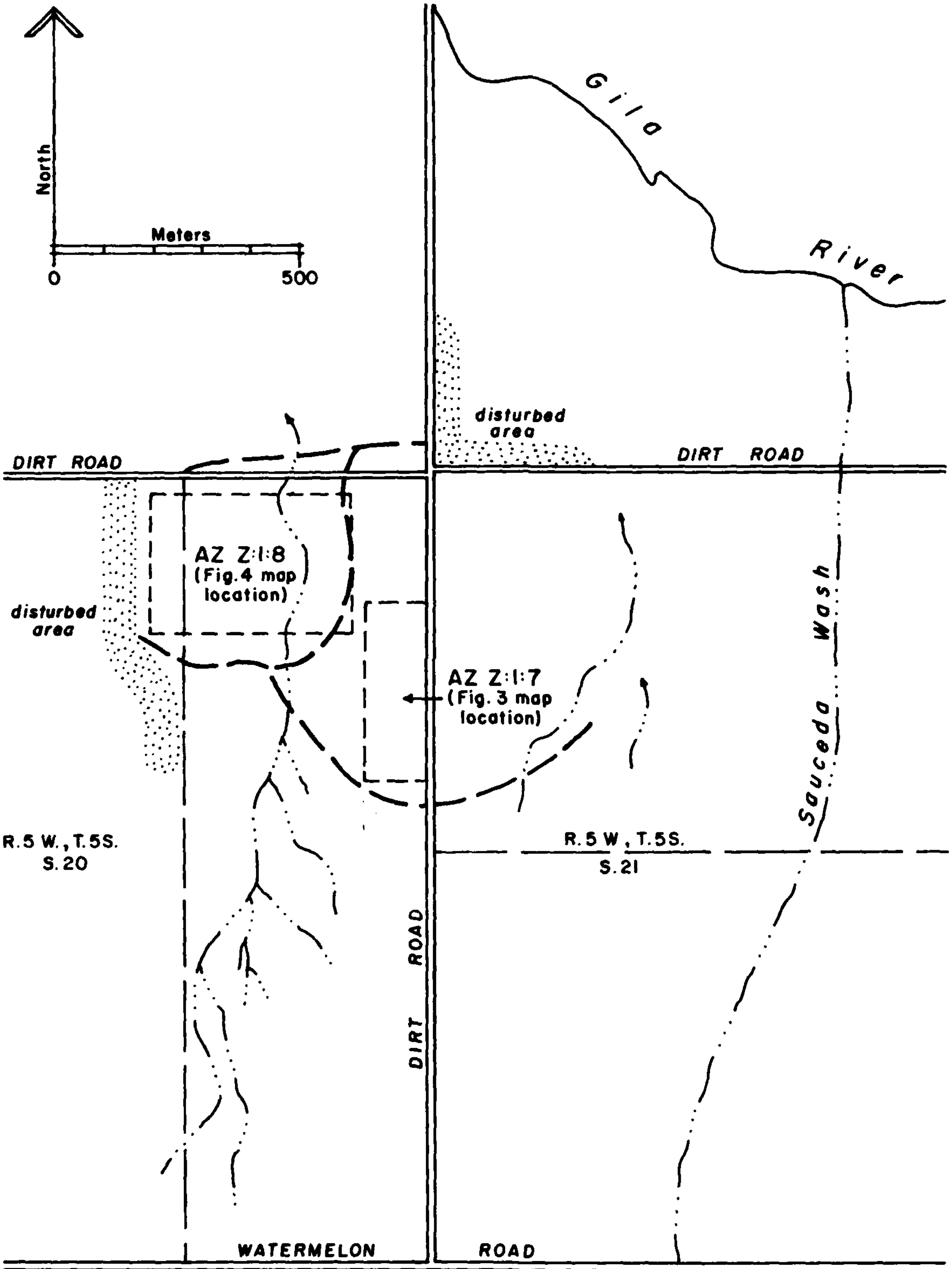

Figure 2. Location of AZ Z:1:7 and AZ Z:1:8

Testing at AZ Z:1:8 revealed no structures. The partial contemporaneity of this site with AZ Z:1:7 suggests that any distinction between the two sites may be more apparent than real and that they may represent a single community. That part of AZ Z:1:8 that was tested may be a somewhat peripheral portion of the complex. It should be noted, however, that the limited time available for work at the site and the extremely small sample represented make it more likely that structures are indeed present that were not found.

Testing in the area designated AZ Z:1:7 was somewhat more productive than that at AZ Z:1:8. A structure and several other features were excavated. Work was concentrated along a ridge that exhibited cultural debris localized at intervals along its top and sides. Cremations have been reported from the site, and were said to have been distributed along the eastern periphery of the ridge, apparently coinciding to some extent with the locations of the more dense artifact concentrations recorded along the ridge top and on the western slopes. This suggests a series of separate habitation locations that may or may not have been contemporaneous.

It is apparent that the occupation of the areas excavated was of the dispersed character so typical of the Preclassic Period Hohokam village pattern. Examination of the surface of AZ Z:1:7 east of the road in the area not investigated does indicate, however, a significantly more dense artifact concentration, and it is thought that the center of the site complex probably lies in that area.

Given this perspective on the site and on the results of the testing, it is clear that inferences must be made with care because of the limited and undoubtedly biased sample obtained.

Field Methods

In light of the short period of time available for work at the site, it was necessary that as much attention as possible be given to the rapid discovery of feature locations. A backhoe was used for this purpose, with trenching concentrated in the areas of highest artifact density. Trenches were either aligned as transects of these concentrations or, particularly in the excavated ridge area at AZ Z:1:7, angled along the upper ridge surface.

Excavations were undertaken by hand only in locations where features had been located through machine trenching. There was no opportunity for exploratory trenching in areas of relatively low surface-artifact density.

Features

AZ Z:1:7

Both surface concentrations of artifacts and subsurface features were identified at AZ Z:1:7. Features 4, 5, 6, and 7 (see Figure 3) were the most dense surface concentrations. While artifact density was generally high in the vicinity of the north-south trenching ridge on which excavations were concentrated, it dropped to very low levels (approximately 1 artifact per 10 square meters) elsewhere on the site. The northern periphery of the site also exhibited a generally high density of surface artifacts.

Excavations in many of the areas of relatively high surface-artifact density revealed that the prehistoric occupation surface was often only slightly below present ground surface and that, in some areas, the original surface may have eroded, leaving redeposited clusters of artifacts downslope from the ridge top. Cultural material was seldom found at depths greater than 0.4 to 0.5 m below current ground surface.

Surface soil was a compact, tan sand, sometimes visibly laminated, overlain by a thin layer of looser sand. A red orange tan, compact sand lies under this and usually was found to be sterile.

Only one structure, designated Feature 2, was found. Located on the northern end of the ridge top, this feature was a roughly rectangular pit house with rounded corners, and was 2.75 m in length and 2.4 m in width. The plastered floor was up to 5 cm thick and was overlain by ash and clay remnants of the burned roof. An unlined, ovoid pit in the center of the floor, truncated by a backhoe trench, contained clay and charcoal flecks. This pit measured approximately 0.5 m in width and at least 0.7 m in length. Two possible postholes were also identified. The entryway, however, could not be found.

This house was unusually small, but is similar in this respect to Structure 1, a Sacaton Phase pit house, excavated by Wasley and Johnson at the Citrus Site (1965:38). The latter structure was only slightly larger than the one at AZ Z:1:7, measuring 3.5 m by 2.4 m, and was situated in a relatively isolated location north of the ballcourt.

Three extensive trash deposits, including trash pits, were designated Features 8, 10, and 11. Feature 8 was on the western slope of the north-south trending ridge and consisted of trash and charcoal-flecked, tan sand to a depth of about 10 cm to 20 cm below ground surface. A small Gila Plain vessel was recovered from this deposit.

Feature 10 consisted of a complex of six pits excavated into a sterile, tan sand. The pits were irregular and 0.6 m to 1.0 m in diameter. The surface from which they were excavated was approximately 10 cm below current ground surface. The pits themselves were straight-sided to round in profile and ranged from 0.25 m to 0.60 m in depth.

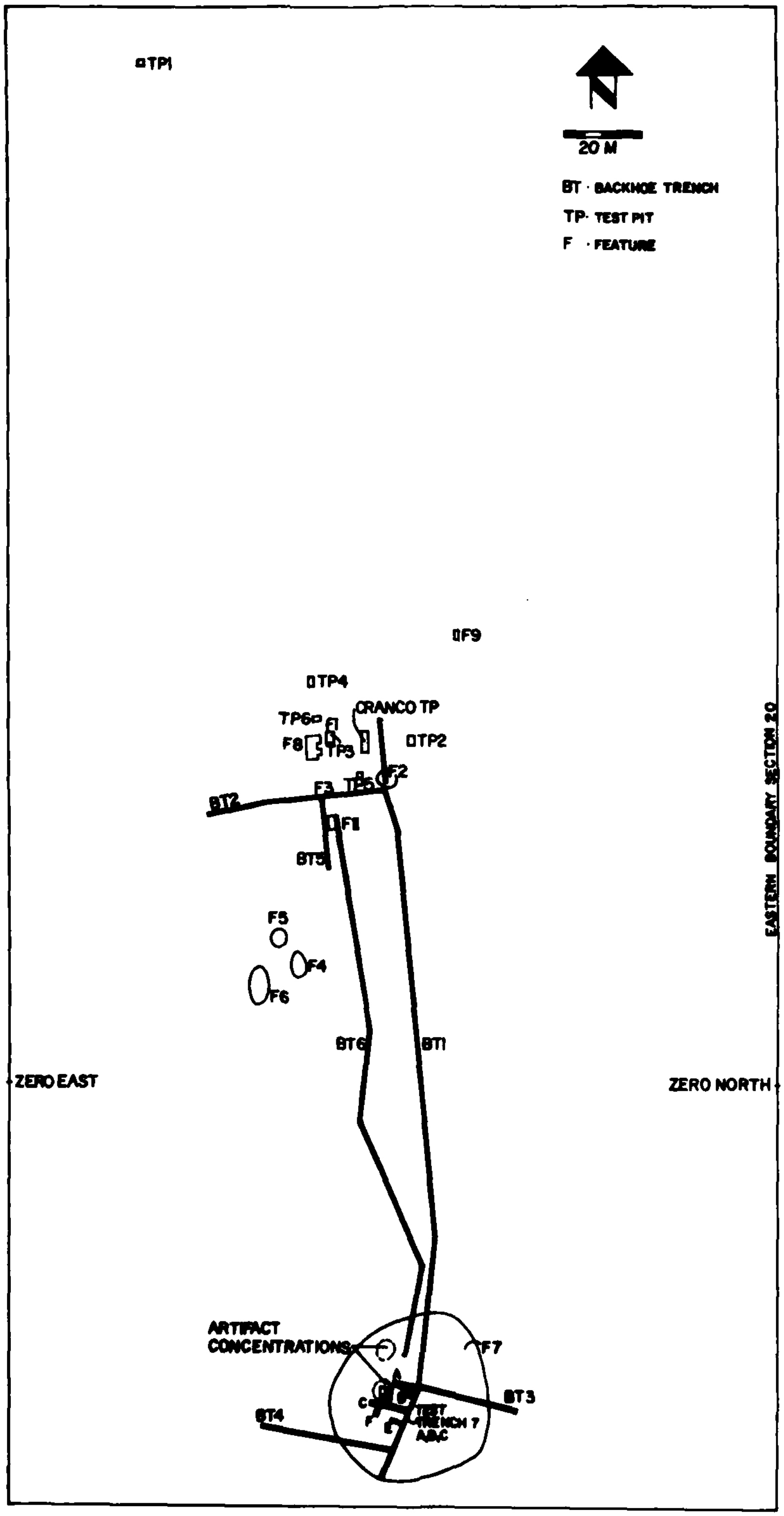

Figure 3. Excavation units and features at AZ Z:1:7

Feature 11 was an irregularly shaped trash-dumping area up to 40 cm in depth, with a fill of charcoal in a tan sand matrix. Areas of a white, silty clay were present within this matrix, which was underlain by a highly compacted, reddish tan sand with an irregular but very compacted surface.

Feature 9 consisted of a dark, charcoal-stained area, 0.25 m to 0.50 m below the surface, that contained ceramics, bone, and fired rock. It may represent the remains of a hearth, although no pit could be defined.

Features 1, 3, and 9 were areas containing ash and flecks of charcoal as well as a moderate density of artifacts. They seem to represent localized areas of debris, in some cases visibly eroded and probably redeposited.

While no structures other than that designated Feature 2 were identified, it can be inferred from the distribution of features along the ridge that three to four discrete habitation areas may be represented. While these might have been contemporaneous, it seems equally likely that the locations of trash and use areas, and probably of houses as well, may have shifted through time in this somewhat isolated but nevertheless clearly associated portion of the AZ Z:1:7 complex.

AZ Z:1:8

Features 1-9 at AZ Z:1:8 were surface-artifact concentrations that apprently represent sheet trash without any subsurface associations (see Figure 4). Feature 8 included, in addition to artifacts and charcoal, fire-cracked rock and probably represents the remains of an eroded hearth.

The surface soil at AZ Z:1:8 was a compact, fine, gray sand up to 50 cm in depth. Laminae were often visible in this stratum. This lay over a fine, light-brown sand containing occasional charcoal flecks of probable natural origin. Below current ground surface, deposits were almost uniformly sterile.

Feature 10, located in the northern portion of the area, differed from the remainder of the area tested. Shallow stripping along a low ridge revealed an ashy, gray, powdery soil with charcoal inclusions that were surrounded by a reddish tan, sterile matrix. Excavation of a trench through this area revealed a steep-sided, well-defined pit. Subsequent excavations failed to reveal equally well-defined contacts elsewhere. Instead, an ashy soil intergraded with the surrounding matrix within an irregular area up to 5 m in diameter. This feature is similar to Feature 11 at AZ Z:1:7 and may represent a trash-dumping area with at least one discrete pit within the larger deposit.

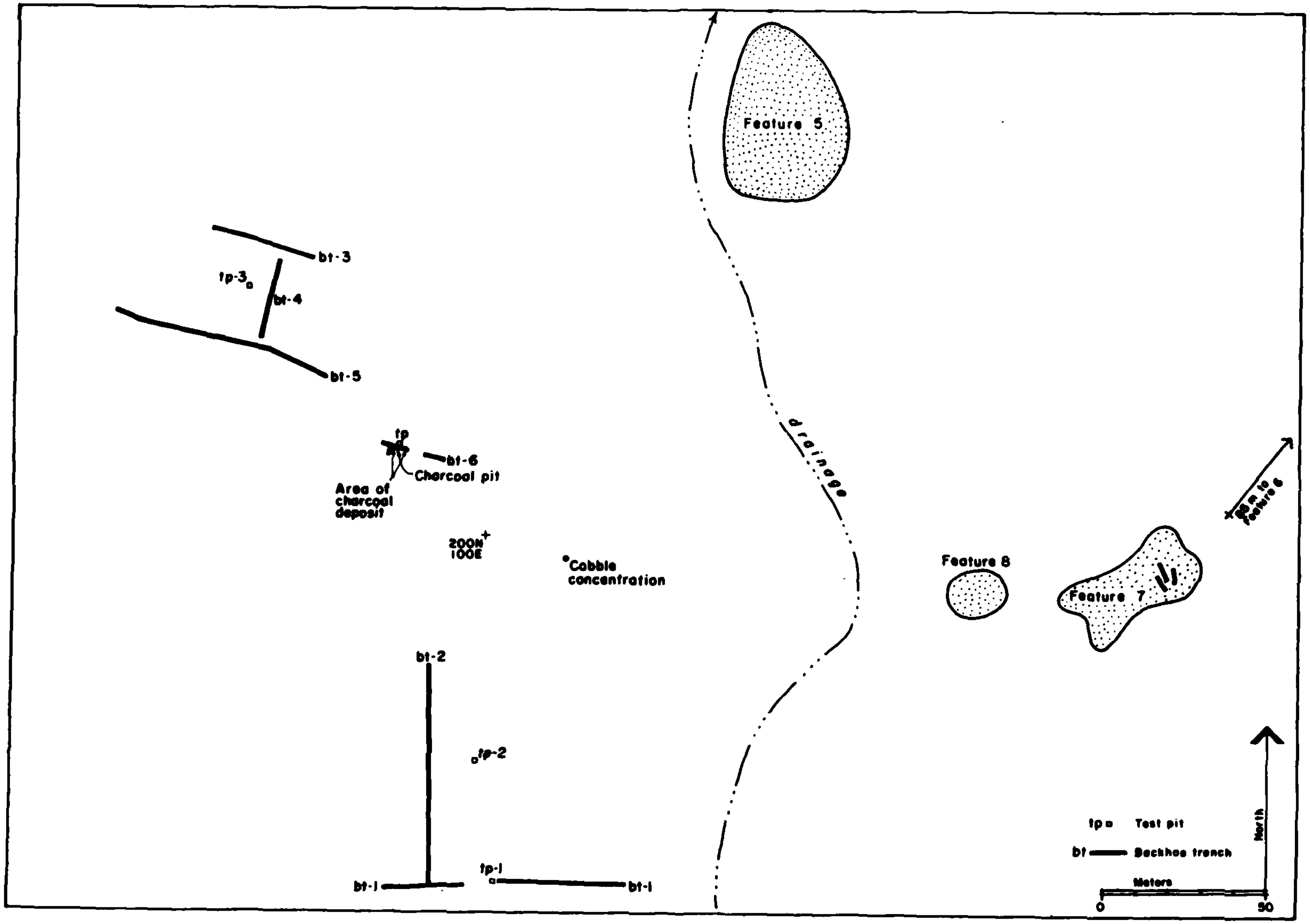

Figure 4. Excavation units and features at AZ Z:1:8

The range of artifacts present, the presence of a trash area (Feature 10), and reports of excavation of cremations in this portion of AZ Z:1:8 all suggest that this was a habitation area. Both lack of time available for more extensive excavation and prior disturbance of areas adjacent to those tested may account for the lack of identified structures or other features.

AZ S:16:36

by Susan A. Brew
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University of Arizona

Although the presence of a "rock circle site" on a high ridge top overlooking the northwestern end of the Painted Rock Borrow Pit Lake and the bottom lands of the Gila River was known earlier, AZ S:16:36 was not surveyed by archaeologists until September, 1979. Because the site was located slightly outside the Corps of Engineers' survey area, it was examined in a cursory manner prior to testing. This quick examination revealed the presence of a number of rock circles and some disturbance to the site. This disturbance consisted of several potholes in rock circles and evidence of cattle grazing, including a possible cow trail through the center of the site. A substantial amount of erosion had taken place, leaving a 3-cm to 5-cm cover of desert pavement, without soil, on the ridge top.

Field Methods

Archaeologists spent a large portion of the first of three field days intensively surveying AZ S:16:36 and flagging all features. These activities revealed the presence of eight possible rock circles surrounded by a fairly dense scatter of lithic artifacts (Figure 5). In addition, the surfaces of a large basalt boulder located at the southwest end of the site and of a smaller basalt rock were found to contain petroglyphs (Figures 6 and 7).

Test excavations and site mapping were carried out simultaneously. Because of the dearth of information available on "rock circle sites," test excavations were geared to answering basic questions concerning site depth, function, cultural affiliation, and date. Unfortunately, however, they revealed little information pertinent to these questions.

Test excavations began with complete excavation of Rock Circle 2 and trenching of Rock Circle 6. A 1 m-by-2 m trench was excavated in an open area between Rock Circles 1 and 2 (test units are shown in Figure 5). These excavations revealed no depth in any of the features, no subsurface artifacts, and no additional features.

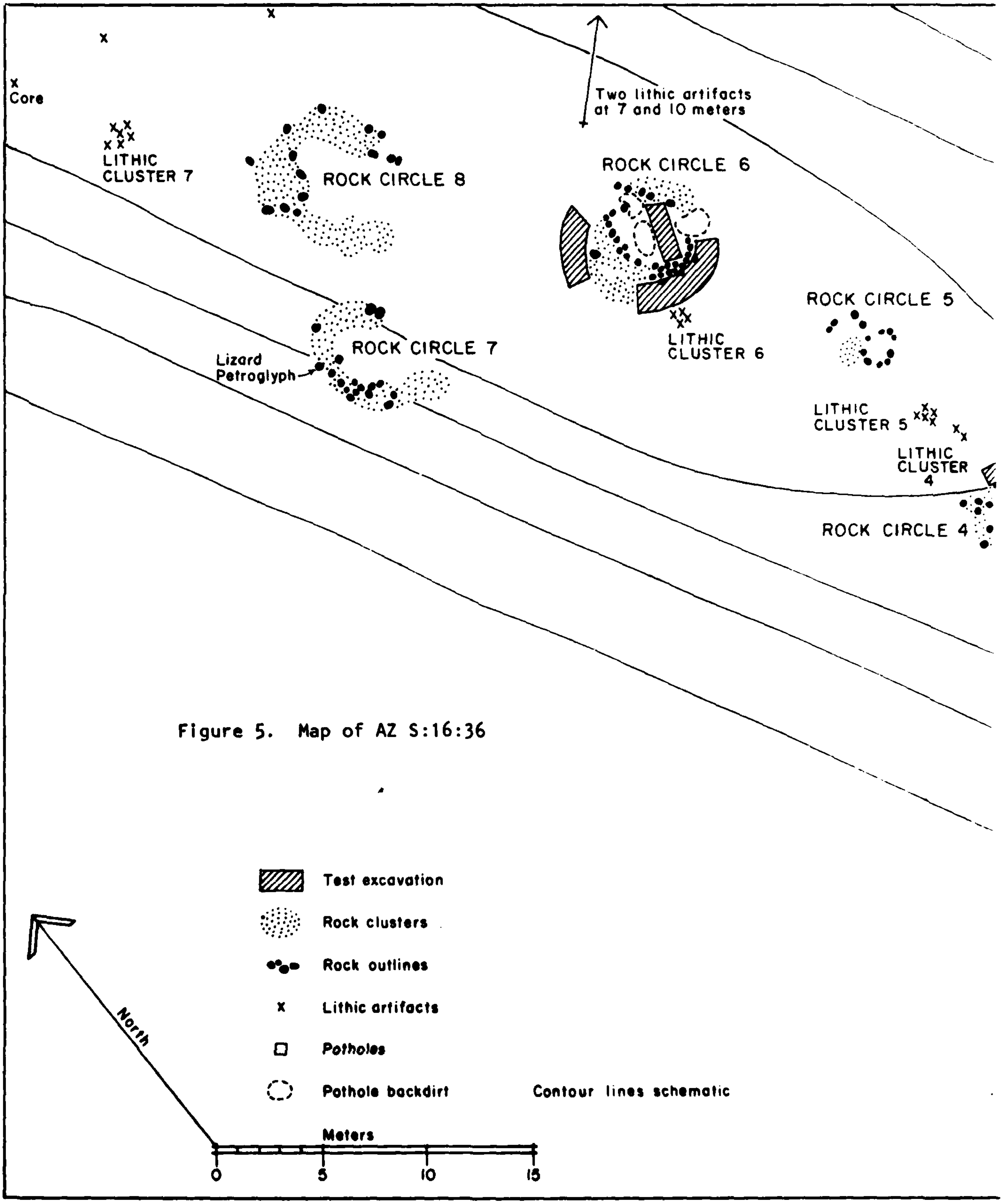
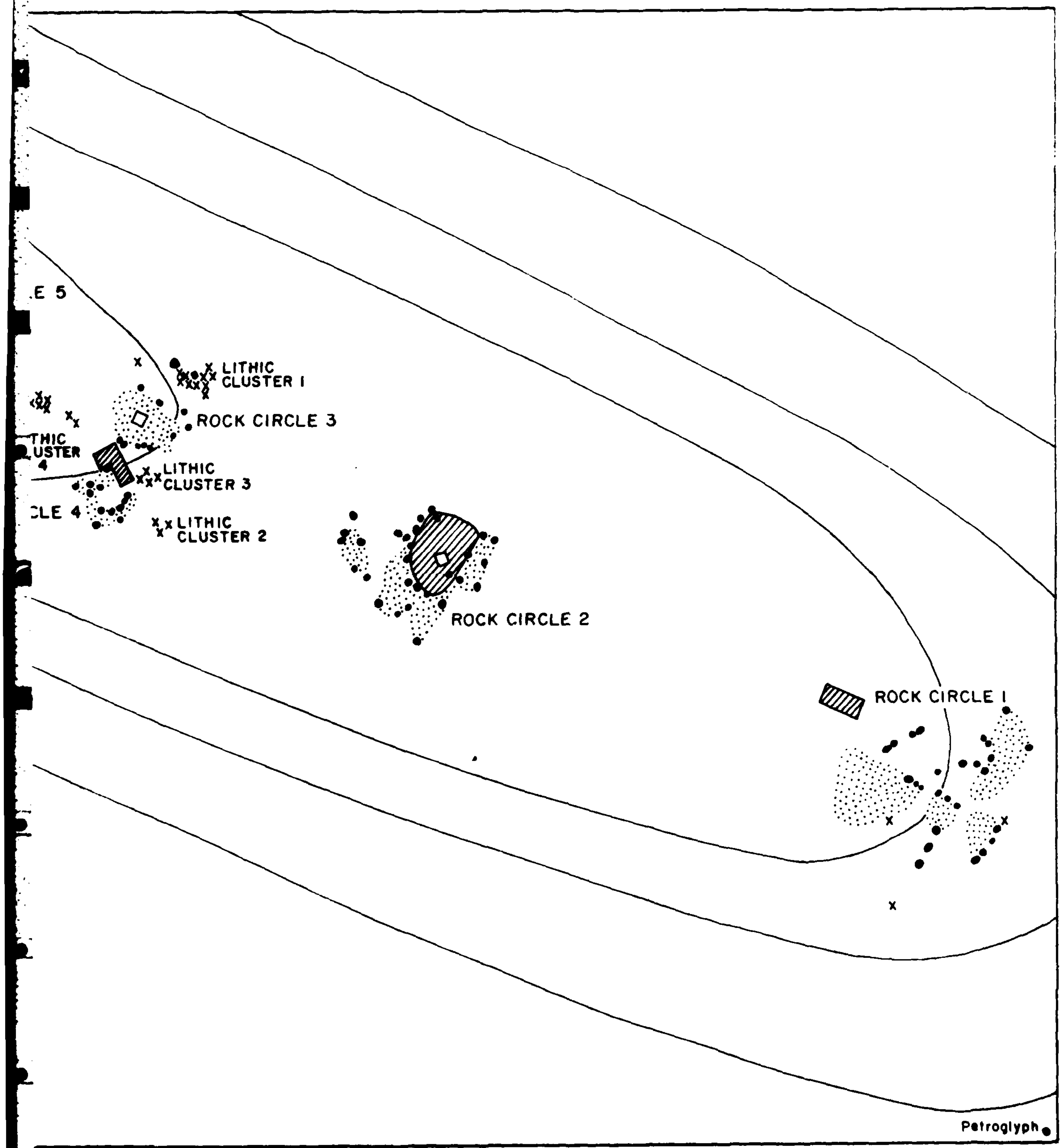


Figure 5. Map of AZ S:16:36


E 5
LITHIC
CLUSTER 1
ROCK CIRCLE 3
THIC
USTER
4
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ROCK CIRCLE 1
Petroglyph

2

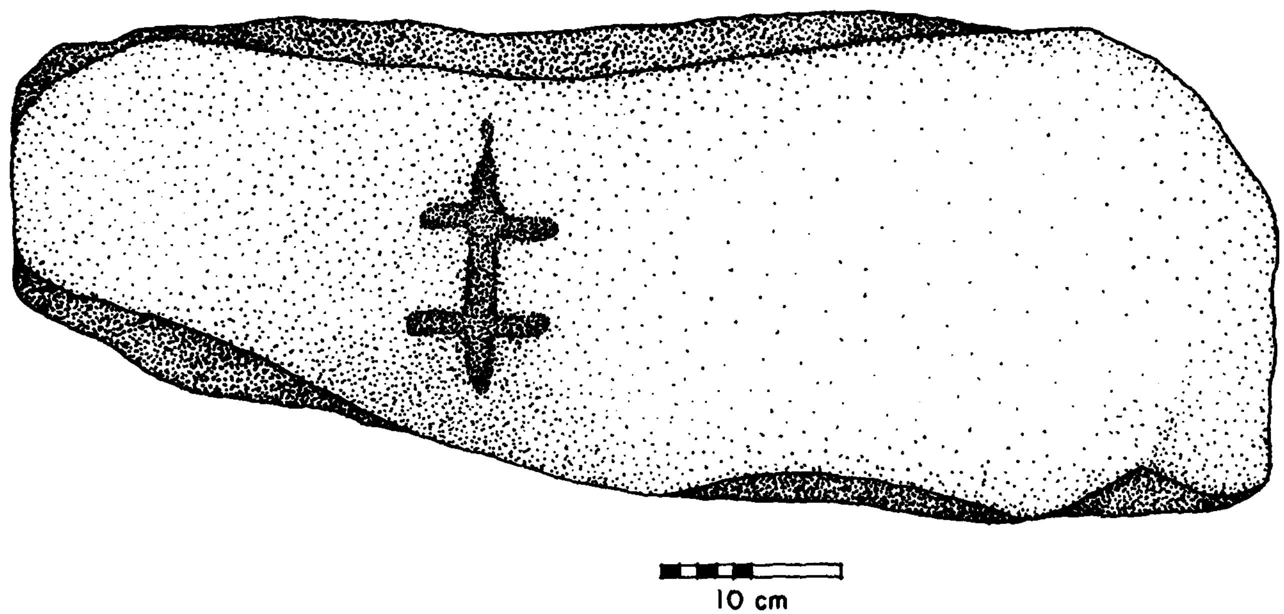

Figure 6. AZ S:16:36 petroglyph

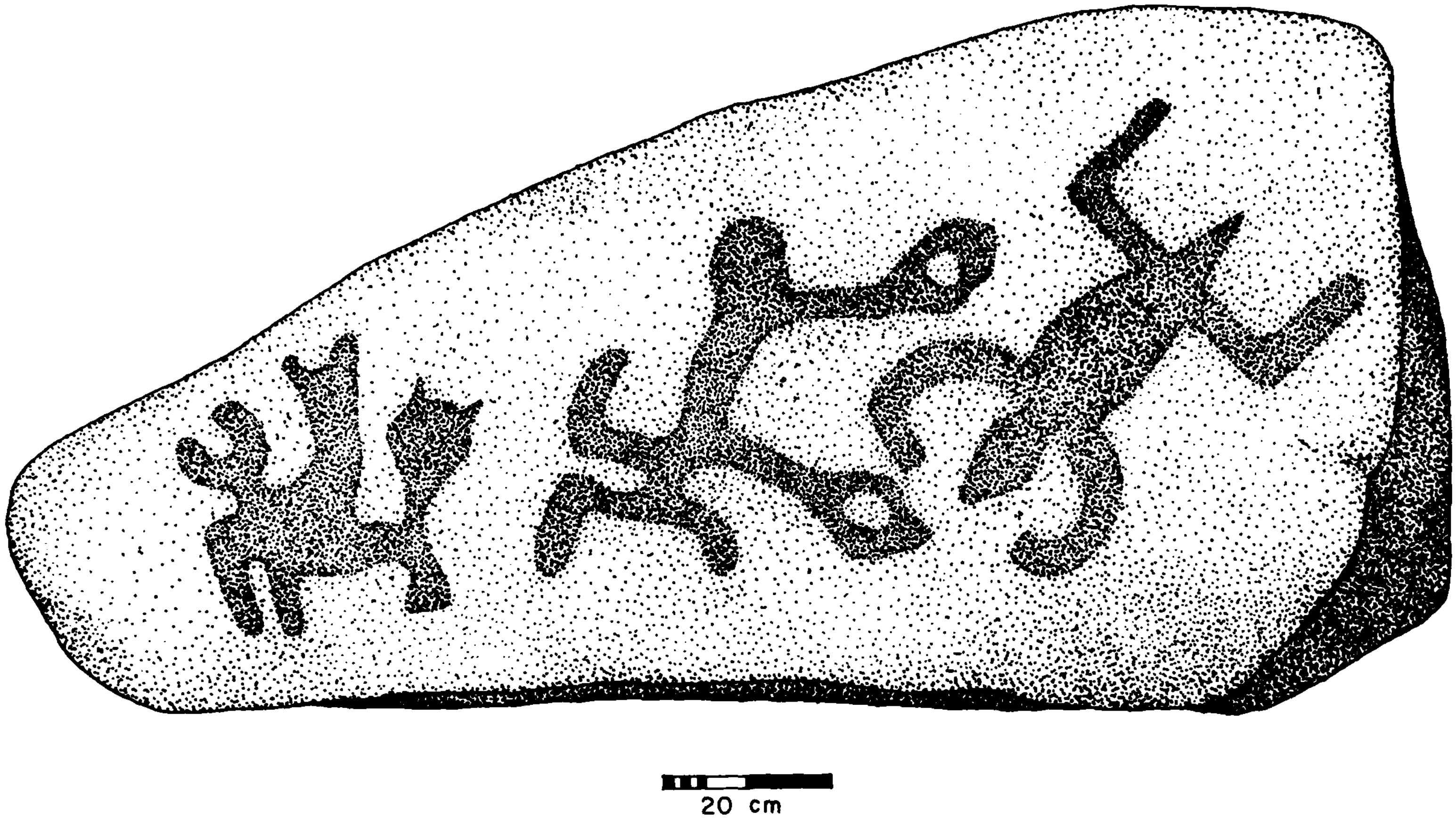

Figure 7. AZ S:16:36 petroglyphs

In each case, excavation revealed a layer of desert pavement, 3 cm to 5 cm deep, on the ground surface. Below the desert pavement lay a gray, extremely light horizon of silt containing smaller amounts of rock and gravel but devoid of cultural materials.

It was thought that more information might be obtained by scraping a large area adjacent to one of the largest and best defined circles, Circle 6, to the depth of the orange clay deposits on the underside of the rocks forming the circle. It was hoped that scraping away the 3 cm to 5 cm of rocks and desert pavement would expose the deflated ground surface on which the circular formations were originally laid out. Unfortunately, this procedure revealed no additional features. Testing revealed no charcoal or hearth areas from which to obtain radiocarbon or archaeomagnetic samples to date the site, and pollen and flotation samples were considered useless because of the extremely eroded condition of the ridge top.

Features

Eight possible rock circles formed of both varnished and unvarnished basalt rocks cover an area approximately 100 m by 40 m on the ridge top. Some circles were quite distinct, while others were quite amorphous. Basalt rocks are sufficiently dense in this area to have allowed circles to be formed by simply clearing rocks from the center of a circular-shaped area, and piling them in a circular configuration around the edge of the cleared area. It is possible that some circles, now appearing as clusters of rock surrounding a cleared center space, could once have been more than one course high. The size of these circles ranges from approximately 5 m to 1.25 m in diameter. When exposed, the undersides of the rocks forming the circles show 3 cm to 5 cm of orange clay, indicating deflation through time.

The circles are surrounded by a fairly dense scatter of chipped stone artifacts, with seven areas of concentration noted within the general scatter. These artifacts consist of, for the most part, cores and unmodified primary and secondary flakes. A very few unifacially and bifacially retouched tools are present in the assemblage, but these are not diagnostic.

The predominant lithic raw material at the site is a medium-grained basalt. A fine-grained rhyolitic jasper also occurs and is the material most often found modified. Small flakes of chalcedony are present as well. The lithic artifacts from the site show a wide range of patination. Heavily patinated artifacts may suggest an early, possibly Archaic age, while others with little or no desert varnish may be more recent (Bruce B. Huckell, personal communication).

The final type of feature present at AZ S:16:36 consists of rocks with incised petroglyphs. Three petroglyphs are etched into a 170-cm-long basalt boulder at the southwest end of the site. Two of the shapes are unrecognizable; one, however, can be distinctly identified as

a lizard. These petroglyphs are quite faint and difficult to see. In contrast, a small petroglyph of a lizard that appears on a 70-cm-long basalt rock in Rock Circle 7 appears more deeply pecked into the rock and quite recent.

Arizona State Museum archaeologist Sharon Urban, who has studied petroglyphs in the area, examined sketches of these petroglyphs and suggested that they may be pre-Hohokam. She finds the designs similar to those of a petroglyph style that extends from the Great Basin into southeastern California.

Conclusions

Although the testing of AZ S:16:36 did not yield certain types of data that were hoped for, the testing was interesting and useful in many respects. Archaeologists were, for the first time, able to examine a rock circle site, a poorly understood phenomenon characteristic of ridge tops in the Painted Rock area.

Testing revealed no depth to the circles, no artifacts within the circles, and no subsurface features associated with the circles. Features on the site are limited to seven areas of lithic concentration, usually locations where one or two cobbles had been flaked, and some petroglyphs. No pottery is present at the site.

Flaked-stone artifacts, predominantly cores and primary and secondary flakes, are fairly abundant on the site, but few are modified tools. It therefore appears likely that the users of the site transported flakes elsewhere to modify and use them. The fact that these artifacts show a great range of patination on similar materials suggests that the site could have been revisted and used over a long period, perhaps from Archaic through historic times.

The petroglyphs also appear to show a substantial difference in age. Three petroglyphs found on a basalt boulder at the southwest end of the site are very faint and eroded, while the lizard petroglyph at Rock Circle 7 looks very recent. The designs depicted by the three petroglyphs on the large boulder may date to pre-Hohokam times. The small lizard petroglyph design is even less diagnostic.

In summary, although little knowledge about the function or origin of rock circle sites was obtained through the short test excavations, archaeologists will have a more concrete notion of what to expect to find at these manifestations in the future. It can also be conluded that these features are not storage pits, although the presence of an above-ground structure having storage functions cannot be ruled out.

CHAPTER 4

ARTIFACTS AT AZ Z:1:7 AND AZ Z:1:8

Ceramics

The preceding discussion of the archaeology of the Painted Rock Reservoir and the surrounding area outlined the importance that ceramic typologies have assumed in interpretations of Gila Bend area prehistory. The plain wares have assumed particular significance because of the uncertainty regarding their association with Hohokam or Patayan ceramic traditions. The uncertainty itself, as well as subsequent difficulty in resolving it, stems from the relatively narrow range of stylistic variation in these ceramics. Over long periods, the changes normally exhibited in paste and temper attributes, usually central to plain ware identification, are difficult to interpret since use of different materials may be due to many causes, including simple proximity. Nevertheless, it may be possible to resolve some of the issues raised during earlier work in the Gila Bend area and in the preceding discussion of its prehistory.

Decorated ceramics with particular stylistic traits are easier to identify and therefore less controversial. Unquestionably, Gila Bend area decorated wares are similar to Salt-Gila area decorated wares prior to the Classic Period and with the decorated wares of the Papaguería and Tucson Basin after that time. Nevertheless, differences of opinion regarding the actual source of the Preclassic Period decorated ceramics recovered in the Gila Bend area have arisen. Wasley and Johnson (1965) regard these as locally manufactured in the style of the Hohokam of the Hohokam "core" area. Schroeder (1967), on the other hand, contends that, during the Colonial Period, these ceramics were imported into the area.

A number of questions regarding the ceramics of this area are explicit in the discussion of Gila Bend area prehistory in Chapter 2. The first, and most important, issue centers upon the question of whether pottery in the Gila Bend area provides evidence of a continuous local tradition regardless of shifts in social, political, or economic alliances, or whether significant discontinuities exist that may represent the arrival of new populations or the displacement of existing groups. It has been argued in this report and in the Phase I survey report (Teague and Baldwin 1978) that continuity in the Hohokam population is more probable. One likely indicator of such continuity is the plain ware assemblage. The conservatism characteristic of plain wares reduces the extent to which relatively short-term, regional phenomena may obscure underlying

homogeneity. Plain wares are not, however, so impervious to cultural variability that a high level of consistency in material choice, surface finish, and vessel form would be expected of different populations even though they had access to the material sources of the same area. It is, therefore, important that plain ware ceramics representing the full time range of prehistoric occupation in the Gila Bend area be reevaluated in terms of these variables. Petrographic analysis of comparative samples from sites dating to the Pioneer through Classic Periods has therefore been undertaken, omitting those types definitely identified as Lower Colorado Buff Wares. Unfortunately, the collections available do not permit a thorough reassessment of vessel form and finish throughout the sequence, but it is believed that comparison of the petrographic characteristics of ceramics from AZ Z:1:7 and AZ Z:1:8 (representing the crucial Colonial-Sedentary Period transition) with those of ceramics from other sites can help clarify the long-term trends in ceramic manufacture in the Gila Bend area.

In reassessing the significance of the plain wares in interpreting the prehistory of the Gila Bend area, the contexts in which Patayan Lower Colorado Buff Wares occur are also significant and will be considered. For example, it has been noted previously (Teague and Baldwin 1978) that the absence of established Patayan ceramic types at the Rock Ball Court Site casts doubt on Schroeder's (1967) assertion that the dominant plain wares at this site are Patayan rather than a variant of Gila Plain.

Evaluation of Hohokam decorated wares in this study focuses on the source of these ceramics. Petrographic analysis can help determine whether these were locally manufactured at all times, as was thought by Wasley and Johnson (1965), or were, during one or more periods, traded into the area, presumably from the Hohokam "core" area in the central Salt-Gila region. Schroeder (1967) suggests an intrusive presence of Hohokam decorated wares in the Colonial Period and leaves open the possibility of subsequent local manufacture

Finally, it is important to evaluate the extent to which the occurrences of ceramic types at AZ Z:1:7 and AZ Z:1:8 differ from those observed at previously excavated sites dating to the same period. Excavations in Painted Rock Reservoir by Wasley and Johnson focused on ball-courts and on sites having these features. These sites have been traditionally assumed to have had special social, political, or economic functions and, possibly, differential access to goods. Given the possibility that regional exchange was of greater economic and political importance to the people of the Gila Bend area than has been thought in the past, and the relationship that this may have had to social and economic differentiation within the society, it is important to examine these types of sites for evidence of significant differences with respect to trade goods and intrusive manufactured items. Unfortunately, this can be done only with great caution, given the small and, quite probably, biased sample available from the excavations at AZ Z:1:7 and AZ Z:1:8.

Hohokam Plain Wares

Gila Plain; Gila Plain, Gila Bend variety; and Wingfield Plain are the plain ware ceramic types that have been associated with the Gila Bend Hohokam. Unfortunately, serious problems arise in an attempt to sort and interpret the AZ Z:1:7 and AZ Z:1:8 ceramic assemblages on this basis. This is scarcely surprising in light of the earlier comments of Wasley and Johnson:

> Gila Plain, Gila Bend variety grades into Gila Plain. Although most sherds of Gila Plain, Gila Bend variety can be distinguished from Gila Plain, there are cases in which the separation is difficult. This would seem to indicate that materials available in the Gila Bend area for the production of pottery graded from those in which quantities of mica were present to those with absolutely no mica. Another possibility is that Hohokam potters in the Gila Bend area attempted to duplicate Gila Plain by adding quantities of mica to the paste. Usually, however, less mica was incorporated, and Gila Plain, Gila Bend variety was the result (1965:13).

With particular regard to Gila Plain, they further note that:

> One of the difficulties of working with this type, as it is known in the Gila Bend area, is the fact that it grades imperceptibly into Wingfield Plain. Wingfield Plain (Colton 1941: 56) is supposedly distinguished from Gila Plain on the basis of mica-schist tempering in the former type and its absence in the latter which has instead quantities of mica in the paste (Gladwin and Gladwin 1933:26). Many of the Gila Plain sherds from the Gila Bend area have mica-schist as a component of the temper. Distinguishing the two types then becomes a problem of quantitative differences in the amount of mica-schist in the tempering material. In most cases, it is impossible to tell whether a given sherd belongs to one or the other type. For this analysis, questionable sherds were lumped with Gila Plain, the older and better established type (1965:27).

In spite of this profusion of intergrading ceramic types, Wasley and Johnson identify the most significant point in stating that "it is worthy of note that Gila Plain and the Gila Bend variety are found in all of the later phases encountered in the Gila Bend area" (1965:13).

Examination of ceramics from AZ Z:1:7 and AZ Z:1:8, as well as of collections from earlier excavations in the area, shows an apparent continuity in a plain ware tradition. This tradition is characterized by some percentage of "typical" Gila Plain grading in a continuum into an apparently otherwise identical pottery with virtually no mica temper. Quartz, on the other hand, occurs commonly as a temper component, with a much smaller percentage of sherds showing a dark, rock temper. Some examples are well smoothed, but few exhibit extensive polishing. In

examining various earlier collections from the area, it was also noted that identifications of individual sherds as belonging to one of the previously named types is far from consistent.

Results of petrographic analysis provided by Jerome Rose of the University of Arkansas (Appendix A) shed new light on this problem. Samples analyzed include Gila Plain from the Pioneer and Colonial Period Javelina Mountain sites, the Colonial Period Rock Ball Court Site, the Colonial and Sedentary Period Gatlin Site, the Classic Period Fortified Hill Site, and AZ Z:1:7. Samples of Gila Plain, Gila Bend variety were analyzed from all but the Javelina Mountain sites. While the quantity of mica present in Gila Plain is, on the whole, greater than that in Gila Plain, Gila Bend variety, both types were characterized by the presence of varying quantities of quartz, muscovite, and schist. Rose reports, however, that Gila Plain, Gila Bend variety often includes small quantities of finely ground sherd temper as well. This difference persists through time.

The petrographic analysis also suggests substantial idiosyncratic variability in temper composition and preparation between and within sites. This is not surprising when the history of confusion arising from variable, intergrading tempers in these ceramics is considered. Some variability may, nevertheless, be attributable to other than idiosyncratic variables. Given the current sample, however, this cannot be determined.

For example, Gila Plain, Gila Bend variety sherds from AZ T:13:9, the predominantly Gila Butte Phase Rock Ball Court Site, exhibit unusually large quantities of sherd temper, yet, in other respects, fall within the normal range of tempers for this variety. This may reflect the habits of an individual potter, some form of geographic variability (this site lies in the northwestern portion of the study area and is relatively distant from other sites from which samples were taken), or, possibly, temporal variability. The last possibility is rendered unlikely by the absence of similar material in sherds from sites of roughly similar age, but the probability of significant bias in the small samples prohibits any real confidence in this inference.

When the results of the petrographic analyses were received, the discovery of sherd temper in the Gila Plain, Gila Bend variety, ceramics was thought to represent the only such case known for Hohokam ceramics. Subsequent inquiries revealed, however, that in the past year two other instances have been noted. Pat H. Stein (1979:146-152), in a report of petrographic analysis of Sacaton Red-on-buff and Gila Red ceramics from sites near the Gila River in the Florence area, was able to identify sherd temper in both types. Renee Peopy of the Museum of Northern Arizona has likewise found evidence of sherd temper in ceramics from the Cashion Site, west of Phoenix (Stein, personal communication). Unfortunately, red wares were not submitted for analysis in this study; thus, it is not possible to comment on the comparability of red wares in the Gila Bend area. These results suggest, however, that this attribute may prove

useful in future studies of regional interaction. It is not a common attribute, nor can it be explained by accidents of local material availability.

At present, it can only be noted that the persistence of this attribute through time in the local ceramics of the Gila Bend area is significant in that it establishes the continuity of a local ceramic tradition. The implications of its appearance east of this area on the Gila River, at a site west of Phoenix, and possibly elsewhere should be investigated.

Tables 2 and 3 present the results of analysis of ceramics from these sites.

Patayan Plain Wares

In identifying Patayan plain wares, comparisons were made to examples in the Arizona State Museum collections and in 1978 Painted Rock survey collections examined and typed by Michael Waters. Patayan ceramics represented a secondary (see Table 2) but not insignificant portion of the assemblage. They were, in all cases, found in association with Hohokam ceramics.

The dominant Patayan plain ware type was Colorado Beige, which Waters has dated to the period A.D. 500-1050. While the highly variable temper characteristic of this type, including quartz and feldspars (see Huckell 1979) in some examples, renders its differentiation from Gila Plain, Gila Bend variety difficult, it can usually (if not invariably) be sorted by reference to the presence of coarse wipe marks on a surface that is frequently highly burnished and typically beige to brown gray.

Palomas Buff was also present. This type contains some fine micas and feldspars, as well as quartz, in the temper. It is interesting that micaceous temper appears in these ceramics after a period of exposure to Hohokam ceramic traditions. The Palomas type is characteristically very soft and not as well polished as are some examples of Colorado Beige. A cream-colored scum coat is often present. There is also a stucco variety of this type, although no examples of it were identified at AZ Z:1:7 and AZ Z:1:8.

Red Wares

Red wares included only two types, the Hohokam Sacaton Red and the Patayan Colorado Red. These were easily distinguished on the basis of the mica-schist temper of Sacaton Red, completely absent in Colorado Red, as well as other characteristics of the types as described by Haury (1976;222) for Sacaton Red, and by Waters for Colorado Red. No petroglyphic analysis of these types was undertaken.

Table 2. AZ Z:1:7 ceramics

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
S 60-70N 80-90E	27	160	5	-	-	13	-	-	-	-	205
38N/70E Feature 5	-	4	-	-	-	1	-	-	-	-	5
38N74E Feature 4	-	2	-	-	-	-	-	-	-	-	2
S 80-90N 70-80E	31	135	-	-	-	7	-	-	-	-	173
S Backhoe Trench #2	-	53	-	-	-	8	-	-	-	-	61
Backhoe Trench #3	-	2	-	-	-	-	-	-	-	-	2
Backhoe T#2 Feature 3	-	3	-	-	-	-	-	-	-	-	3
S 80-90S 90-100E	30	190	14	-	-	23	-	-	-	2	259
S 65-75S 90-100E	7	101	9	-	-	17	-	-	-	2	136

Table 2. (continued)

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
Backhoe Trench #3	-	-	-	-	-	1	-	-	-	-	1
TS 7A	-	3	-	-	-	1	-	-	-	-	4
TS 7C	-	1	-	-	-	-	-	-	-	-	1
TS 3A	-	2	-	-	-	-	-	-	-	-	2
Feature 9	-	8	-	-	1	-	1	-	-	-	10
Feature 9 Fill	-	1	1	-	-	-	-	-	-	-	2
Feature 8	-	1*	-	-	-	-	-	-	-	-	1*
Feature 8	-	16	-	-	1	6	-	-	1?	-	23
Feature 8	-	1	-	-	7	-	-	-	-	-	8
S TS 4	-	1	-	-	-	-	-	-	-	-	1
Feature 10 TR 7D	-	46	4	-	-	2	-	-	-	-	52

* whole vessel

Table 2. (continued)

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
Feature 11 Backhoe T #4	-	28	4	-	-	8	-	-	-	-	40
Feature 10 Pit A	-	9	2	-	-	-	-	-	-	-	11
Feature 10 Pit B	-	8	2	-	-	2	-	-	-	-	12
Feature 10 Pit D	-	1	-	-	-	-	-	-	-	-	1
Feature 10 Pit E	-	-	-	-	-	2	-	-	-	-	2
TOTAL	95	780	41	0	9	93	1	0	1?	4	1023

Table 3. AZ Z:1:8 ceramics

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
S 90-100N 90-100E	52	155	14	3	-	64	-	6	-	-	294
S 80-90N 90-100E	87	162	-	-	-	-	15	-	-	-	264
S 90-100N 90-100E/SE	3	9	-	-	-	-	1	-	-	-	13
S 70-80N 95-100E	6	34	-	-	-	-	2	-	-	-	42
S 60-70N 95-100E	22	21	-	-	-	-	-	-	-	1	44
S 50-60N 95-100E	-	5	-	-	-	1	-	-	-	-	6
S 100-110N 95-100E	3	70	-	1	-	12	-	-	-	-	96
S 110-120N 95-100E	4	30	-	-	-	13	4	-	-	-	51
S 120-130N 95-100E	14	28	-	-	-	-	-	12	-	-	54

Table 3. (continued)

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
S 130-140N 95-100E	5	45	-	4	-	20	6	-	-	-	80
S 140-150N 95-100E	2	29	-	-	-	7	-	2	-	-	40
S 150-160N 95-100E	5	20	-	-	-	-	9	-	-	-	34
S 160-170N 95-100E	4	31	-	-	-	5	-	-	-	-	40
S 170-180N 95-100E	9	15	-	-	-	-	-	23	-	2	49
S 180-190N 95-100E	5	20	-	-	-	3	-	-	-	-	28
S 190-200N 95-100E	11	23	-	-	2	-	2	8	-	-	46
Backhoe Trench #2	-	1	-	-	-	1	-	-	-	-	2
Backhoe Trench #3	-	2	-	-	-	1	-	-	-	-	3

Table 3. (continued)

Provenience	Gila Plain	Gila Plain-Gila Bend Variety	Santa Cruz R/B	Sacaton R/B	Sacaton Red	Unident. Hohokam Buff	Unident. Buff	Colorado Beige	Palomas Buff	Colorado Red	Total
Backhoe Trench #4	-	2	-	-	-	-	-	-	-	-	2
Backhoe Trench #5	-	3	-	-	-	-	-	-	-	-	3
Feature 7	15	111	-	-	-	3	10	10	-	40	189
Feature 8	-	10	-	-	-	-	4	-	-	-	14
S 50-60N 95-100E	9	5	-	-	-	-	-	-	-	-	14
TOTAL	256	831	14	8	2	130	53	61	0	43	1408

These types occur together in some proveniences, always in relatively small numbers. This is not surprising given the overlap of the dates (A.D. 500-1000) given for Colorado Red by Waters with the A.D. 900-1100 range assigned to Sacaton Red.

Santa Cruz and Sacaton Red-on-buff

Because a large percentage of the pottery sample from the sites was recovered from surface contexts, a considerable number of the Hohokam buff ware sherds found could not be assigned to a specific phase. However, none of the decorated ceramics identified represented a phase other than the Santa Cruz and Sacaton.

Preliminary results of petrographic analysis tend to confirm Wasley and Johnson's assertion that Hohokam decorated wares in this area were locally produced. The temper exhibits the same range of materials (quartz, muscovite, and schist) identified in the plain wares. Particularly noteworthy, however, is the fact that one sherd of Santa Cruz Red-on-buff was found to contain the finely ground sherd temper associated with Gila Plain, Gila Bend variety. This suggests that Schroeder (1967) was incorrect in supposing that Hohokam decorated wares were imported into the Gila Bend area during the Colonial Period and are unrelated to the plain wares with which they were found. Rather, it offers strong support for the idea that Gila Plain, Gila Bend variety ceramics were produced by the same people who were making Hohokam buff wares, and this suggests that the dominant local plain ware was not the product of some essentially non-Hohokam group.

Summary

The opportunity to examine an intact, though very small, ceramic collection from the Gila Bend area has provided an opportunity to resolve several long-standing controversies regarding the ceramics of that area. Preliminary results of the petrographic analysis of these ceramics supports the definition of Gila Plain, Gila Bend variety as a distinct, local ceramic type that can be identified as the dominant plain ware in local assemblages. The local manufacture of Hohokam decorated wares is also supported by these results. To the extent that ceramic technology and style may be said to reflect the larger social relationships of groups of people, these findings tend to confirm the presence of a local group that shared some, but not all, of the traditions of the Hohokam of the central Salt-Gila area.

Lithic Artifacts

by Mary Bernard
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Chipped Stone

An initial sort of all chipped stone materials collected from sites AZ Z:1:7 (surface and excavation) and AZ Z:1:8 (surface) during the 1978 test excavations in Painted Rock Reservoir was undertaken and completed. The combined summaries of breakdowns of those assemblages appear in Table 4. Presentation of the sites' assemblages was combined in order to facilitate description and discussion in view of their fragmentary nature. This approach allows for some descriptive comparison, with due consideration of the apparent lack of discrete site boundaries. Because of the generally poor diagnostic quality of these assemblages (the collections were dominated by broken debitage and debris as opposed to complete, measurable debitage), the analysis was not refined beyond a preliminary sort. Therefore, lacking a detailed analysis as well as extensive collections, no attempt was made to offer explanations concerning the "typical" nature of Painted Rock Reservoir lithic assemblages.

The outline in Table 4 presents the combined lithic artifact findings as well as the basic categories used in the initial sort. The analysis employed three artifact categories: debitage counts (complete or broken); tools, cores, hammerstones, and complete or broken ground stone; and debris. Raw material types were noted for each group and will be discussed in relation to tool and debitage categories. A brief, more intensive analysis of tools was undertaken since formal tool types were not well represented among the assemblages. Descriptions of tool classes and assemblage tabulations appear in Table 5. As was previously mentioned, no detailed analysis of debitage or cores was attempted because of the fragmentary condition of materials. All classes of artifacts and their relative percentages of raw material types in relation to the total counts are presented in Table 6.

Debitage

None of the complete debitage was measured. It was sorted according to the following categories: decoritication flakes (exterior cortex retained on 50 percent or more of the surface), secondary flakes, biface-thinning flakes, and retouch flakes (essentially flakes less than 15 mm in length that were produced by tool retouch). The breakdown of categories and raw materials per class is described in Table 4 and Table 6. Secondary flake production is well represented at these sites. The predominant raw material for flakes is basalt, which is equally represented in tool and

Table 4. Combined summaries of chipped and ground stone assemblages from AZ Z:1:7 and AZ Z:1:8

Artifact Type	AZ Z:1:7 Surface	AZ Z;1:7 Excavation	AZ Z:1:8 Surface	Total
Decortication flakes	85	10	120	215
Secondary flakes	179	24	347	550
Biface-thinning flakes	-	-	19	19
Retouch flakes	26	2	363	391
			Subtotal	1175
Tools	14	5	27	46
Cores	22	2	29	53
Hammerstones	10	1	9	20
Ground stone	13	4	31	48
			Subtotal	167
Debris	121	5	228	354
			Total	1696

Table 5. Combined summaries of chipped stone tool assemblages from AZ Z:1:7 and AZ Z:1:8

Assemblage	Scrapers	Projectile Point Preforms	Knives	Retouched Pieces	Notches	Choppers	Denticulates	Total
AZ Z:1:7 Surface	1	-	-	7	-	5	1	14
AZ Z:1:7 Excavation	-	-	-	3	1	1	-	5
AZ Z:1:8 Surface	-	1	1	17	1	6	1	27
Total	1	1	1	27	2	12	2	46

Table 6. Combined summaries of raw material frequencies within chipped and ground stone assemblages from AZ Z:1:7 and AZ A:1:8

	Rhyolite	Basalt	Diorite	Obsidian	Chert	Jasper	Chalcedony	Quartzite	Quartz	Slate	Limestone	Silicified Limestone	Sandstone	Other	Total	Percent
Debitage and debris	29	547	-	377	73	4	48	358	4	-	-	75	-	12	1527	90.1
Tools	2	19	-	7	4	2	9	-	-	-	-	3	-	-	46	2.7
Cores	1	32	-	1	2	-	2	11	-	-	-	4	-	-	53	3.1
Hammerstones	-	11	-	-	1	-	-	7	-	-	-	-	-	1	20	1.2
Ground stone	3	34	-	-	-	-	-	11	-	-	-	-	-	-	48	2,7
Total	35	643	0	385	80	6	59	387	4	-	-	82	-	13	1694	
Percent	2.1	37.9	0	22.7	4.7	0.3	3.5	22.8	0.2	0	0	4.8	0	0.8		

core percentages. Unfortunately, even though the percentage of obsidian retouch flakes is the larges for all material types represented, obsidian is not represented in the form of finished tools, which indicates that finished obsidian tools were removed from the site. It is of interest to note that a cache of obsidian was found in a small ceramic vessel during the excavation of Feature 8 at AZ Z:1:7. Artifacts found in this context were unused flakes (19), both decortication and secondary, along with two possible cores and some debris.

Tools

Recovery of utilized flakes or formal tool types from both sites was extremely low. Table 5 breaks down the observed tool classes with respect to each site.

Scrapers. One possible basalt core scraper was identified among the surface materials from AZ Z:1:7.

Projectile Points. This class of tools was definitely not well represented among the materials from either AZ Z:1:7 or AZ Z:1:8. Only one fragment of a possible projectile point preform of obsidian was recovered from the AZ Z:1:8 surface collection. In light of the incomplete state of this specimen, it is difficult to reach any conclusions regarding its style.

Knives. A single basalt fragment exhibiting bilateral invasive retouch was recovered from surface materials at AZ Z:1:8.

Retouched Pieces. Statistically, retouched pieces were the tool type best represented within the assemblages. Characterization of a dependence upon tools of this informal nature can only be described as opportunistic. Within this category, the artifact most frequently noted was the marginally retouched piece, which exhibits what is usually described as light, uneven, lateral retouch. These artifacts raise two rather difficult questions. First, are they tools or are they materials that have sustained non-use-related edge damage? A second, much more difficult question involves the material from which most of these artifacts were produced--basalt. Marginal edge wear on a particularly dense material like basalt may indicate continuous use, which would not be easily distinguished. Retouched pieces is the broadest tool category; concerning the preference of utilized materials it includes flakes, cores, chunks of debris, and shatter.

Notches. Both of the notches identified (one each from surface and excavated contexts at AZ Z:1:8) had been produced from basalt core fragments. While a function as smoothers has been postulated for these implements, it is difficult to suggest any functional interpretations on the basis of only two specimens.

Denticulates. Two relatively large, denticulated flakes displayed, at least on one margin, a series of three or more contiguous notches. These flakes were recovered from AZ Z:1:7 and AZ Z:1:8 during surface collection. One was produced from a core and the other from a quartzite flake.

Choppers. A total of 12 large, unifacially worked choppers was recovered from the two sites. Several of these tools exhibit extensive edge damage or secondary retouch, indicating continuous or heavy use. Indeed, of all the tool types discerned within these assemblages, this type perhaps best reflects the kinds of activities that were conducted at these sites. The function of choppers, though not readily apparent, can be inferred on the basis of ecological and subsistence-related information, once that information has been obtained. These implements were manufactured consistently from quartzite or basalt cobbles.

Cores

No detailed analysis of cores from either site was undertaken. The raw materials represented by the various core types recovered correlate well with those represented by tools and debitage; most of the cores are of basalt. Noteworthy, however, is the cache of small nodules of obsidian in a pot recovered during excavation of Feature 8 at AZ Z:1:7; this may represent a reserve of obsidian flake-cores. Most of the cores recovered were amorphous and exhibited no consistent pattern of core reduction.

Hammerstones

Twenty hammerstones, all of them manufactured from locally available cobbles of basalt and quartzite, were recovered. One core-hammerstone was recovered as well. Most of the complete specimens exhibit extensive damage, and several fragmentary specimens are broken, perhaps through use.

Ground Stone

The only complete pieces of ground stone recovered were two quartzite-pebble manos. The ground stone specimens collected from the surface of AZ Z:1:7 and AZ Z:1:8 consisted primarily of fragments of coarse-grained basalt. Given the condition and small size of the sample,

it is impossible to derive meaningful inferences concerning grinding activities at these sites.

Summary

The limited sample size and the fragmentary condition of the lithic assemblages recovered from AZ Z:1:7 and AZ Z:1:8 preclude any discussion of the techniques used to produce them. Choice of manufacturing technique was probably dictated by the nature of the available raw materials. The lack of artifacts such as metates, hoes, and projectile points prohibits the development of any meaningful inferences regarding subsistence-related activities at these sites.

Marine Shell

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Introduction

The archaeological investigations carried out at AZ Z:1:7 and AZ Z:1:8 yielded a combined sample of over 100 pieces of marine shell. The assemblage represents the remains of shell-modification activities designed to produce jewelry items, with the primary emphasis on the manufacture of *Glycymeris* bracelets.

A total of 121 pieces of shell was collected at the two sites. At least seven species are represented, although only four different species (*Glycymeris gigantea* Reeve, *Glycymeris* sp., *Laevicardium elatum* Sowerby, and *Argopecten circularis* Sowerby) were classifiable using the taxonomic system presented by Keen (1971). The remaining species did not offer enough features to permit identification. All four species listed above are common, modern-day inhabitants of the Gulf of California, and *Laevicardium elatum* can be found along the coast of southern California as well. The living shells of these clam species can be readily located in shallow waters in a mud or sand substrate, and all have been sought for their edible contents as well as for their shells. The empty valves can be found as cast-ups in beach drift, where they may frequently be collected in quantity.

The Assemblage

Without exception, it appears that the artisans of both sites were faced with the task of working old shells that had been obtained some time after the mollusks had died. The attractive natural coloration found on fresh shells was absent on all recovered valve fragments, which had become white or gray as a result of bleaching caused by postmortem exposure. Many of the Glycymeris fragments showed extensive worm scarring and tunneling. This often left the shell considerably weakened. Several of the broken bracelet bands recovered had snapped through weakened areas where such damage had been sustained. Surface relief was also obliterated on most specimens because of weathering and natural abrasion. Such exposure indicates that the original collectors of the shells probably gathered them either from along the beach or possibly from extensive prehistoric shell middens known to occur along the Gulf's shore (Gifford 1946:215).

A small number of fossil shell fragments in the sample suggests that another source of shell was exploited as well. The fossil material can be easily identified by its darker color and by the characteristic presence of a cementlike, sandy matrix, particularly in the umbonal recesses in clams. Completed Glycymeris bracelets that still retain some of this matrix have been found (Haury 1950:369; Haury 1976:Figure 15.9). Haury (1976:307) feels that the uplifted Pleistocene deposits that occur in the vicinity of Puerto Peñasco (Gifford 1946:215) may have been an alternative source of desirable shells, especially Glycymeris. Despite their brittleness, these fossils were actively sought, perhaps as the demand began to exceed the supply offered by the beaches alone. Haury also notes that the use of fossil shell at Snaketown reached its zenith during the Sedentary Period, at which time the use of shell achieved its greatest popularity among the Hohokam.

The collection of shells from AZ Z:1:7 and AZ Z:1:8 represents a small fraction of a typical Hohokam assemblage. All of the genera identified are commonly encountered in Hohokam archaeological contexts. Specialization may be indicated here by the fact that the sample is composed almost exclusively of pelecypod valves, in particular Glycymeris and Laevicardium, which were generally preferred by Hohokam craftsmen. A single exception may be present in the "unknown" category, where a thin sliver of burned shell appears to be a portion of a body whorl from a gastropod. It may have come from a species of Olivella, a small, colorful snail that was frequently made into beads. At least two additional fragments in the "unknown" category represent pelecypod genera different from those identified. One of them, a small piece of iridescent, nacreous shell that exhibits a pearly white color, is of particular interest. Nacreous surfaces are characteristic of several marine genera, such as Pteria, Haliotis, Ostrea, and others, and of one fresh water genus, Anodonta, which was locally available in the Gila River. Such sherds tend to have in common a general thinness and a brittle, platy, easily exfoliated structure. In spite of the great appeal of the unique

coloration of these shells, these features must have impeded the successful crafting of the shell and would surely mitigate against the artifact's preservation through time. The fragment from AZ Z:1:7 bears no evidence of having been worked; it may be a fragment of the freshwater clam, Anodonta.

Unworked Shell

It is always difficult, and often impossible, to distinguish between shell fragments resulting from jewelry manufacture and those produced by natural breakage. Because of the apparent emphasis on bracelet production at both sites, however, it is assumed here that all Glycymeris fragments were produced during some stage of deliberate modification. Of the remaining sample of 29 pieces, 28 are evidently unworked. The bulk of this group (22 pieces) is composed of L. elatum fragments. This species is the largest member of the cockle family (Cardiidae), often attaining lengths of 15 cm or more. The large, deep valves have been extensively used as ready-made bowls and containers, vehicles for elaborate etched designs, and raw material for a wide variety of cut-shell ornaments. In light of the small sample recovered, it appears that the modification of cockle shells was not a significant activity in those site areas that were investigated. Although many of the fragments were of a size and strength suitable for modification, only one specimen showed signs of any intentional alteration.

A fragment of a valve of Argopecten circularis was also found at AZ Z:1:7. The shells of this scallop were often used by the Hohokam for finger rings, whole pendants, and shaped tabular pendants. To produce pendants, the umbonal regions were abraded until the shell was worn through to create the suspension hole. Rings were made by grinding the crown of the valve away until an aperture of desired size was obtained. Unfortunately, the edges of the fragment have broken and exfoliated, making it impossible to discern any remnants of modification that might have been present.

Worked Shell

With two exceptions, the worked shell from both sites is associated with the manufacture of Glycymeris bracelets. Investigations at AZ Z:1:7 produced a single juvenile Glycymeris valve that may have been intended for use as a bead, a common function for these small shells. As in the aforementioned case of scallop-pendant production, the beaks or umbones of these shells were usually abraded until a suspension hole was worn through. The umbo of the specimen from AZ Z:1:7, however, has been removed and the remaining hinge areas ground down and smoothed. It is possible that the suspension hole was inadvertently broken, and that rather than discard the shell, the artisan altered it further for a different, unknown purpose.

One small, irregularly shaped fragment of L. elatum bearing two modified edges was recovered from AZ Z:1:8. One margin has been grooved or incised along a rib line and then snapped at this weak point, while the small remaining portion of the opposite margin has been ground and polished smooth. The two transverse edges bear ragged margins and are unworked. No shape or pattern is evident, which suggests that the specimen is part of a larger piece that was probably broken during the early stages of manufacture.

By far the most significant shell-modification activity conducted within those portions of the sites that were examined was the production of popular, highly prized shell bracelets from the round, heavy valves of the Glycymeris clam. The sheer volume of whole and fragmentary bands recovered from Hohokam sites is often impressive, and represents the exploitation of a staggering number of shells through time, all of which had to be either traded in or obtained by expedition on foot to the Gulf of California. That the popularity of the finished product was not confined to the Hohokam alone is demonstrated by the presence of completed bracelets at archaeological sites in northern Arizona, New Mexico, and southern California (Huckell and Huckell 1979:158). Although other genera are known to have been used in bracelet production, such experimentation was rare and was evidently not encouraged; the overwhelming preference of artisans and consumers alike was for Glycymeris.

The combined total of bracelet-related Glycymeris materials from both sites is 91 pieces, 27 of them from AZ Z:1:7 and 64 from AZ Z:1:8. As mentioned before, for the purposes of analysis, all fragments are considered here to be derived from some phase of bracelet production. The specimens in the sample evidence, for the most part, the intermediate stages of reduction that occur between procurement of the valve and completion of the bracelet. Eleven categories were established in order to organize the sample (see Table 7). The manufacture of a bracelet essentially involved the removal of the rounded back of the valve, which left a ring that was then flaked and ground into the desired size and shape. The final finishing required the elimination of the rough surfaces left by the previous step by abrading and polishing the band until a smooth, glossy surface texture was achieved. Only five fragments evidence the final finishing stage; the majority still exhibit flake scars and rough edges.

The bands and bracelet fragments in the sample are quite homogeneous in appearance, showing no sign of the carving or other elaborate embellishment in evidence on specimens found at several large Hohokam sites to the east, such as Snaketown, the Grewe Site, Los Muertos, the Hodges Site, and others. Because of the small size of the sample and the unfinished nature of most of the specimens, it was not possible to place the bands from the two sites into Haury's (1976:313) bracelet typology. The average band width of ten fragments from AZ Z:1:7 is 5.1 mm, while the average thickness is 4.9 mm. It should be noted, however, that these figures are derived from unfinished specimens; the finished products, of course, would have been smaller.

Table 7. Classification of *Glycymeris* fragments derived from bracelet manufacture at AZ Z:1:7 and AZ Z:1:8

Fragment Type	AZ Z:1:7	AZ Z:1:8	Total
Natural edge intact	2	24	26
Ring with no remaining natural edge	4	8	12
Central disk, no natural edge or umbo left	2	14	16
Unperforated umbo	1	0	1
Percussion debitage (flakes)	5	10	15
Shatter, scrap	1	5	6
Bracelet bands	6	2	8
Faceted cores	1	1	2
Modified umbo	0	0	0
Completed bracelet	5	0	5
Unmodified	0	0	0
Total	27	64	91

The processes by which shell bracelets were manufactured in southern Arizona and northern Sonora seem to fall into three patterns. These patterns differ mainly in the way the central core or disk was removed from the shell. After this step was completed, the subsequent finishing steps were much the same for each pattern and produced identical results. Finished bracelets cannot be distinguished by the core removal technique employed.

The first method was described by Johnson (1960:179) at the Trincheras site of La Playa (Sonora F:10:3) in Sonora. Here, the disks were removed by incising a series of intersecting grooves in a roughly circular pattern and then tapping out the center. The second approach involved rubbing the convex exterior surface of the valve on an abrasive surface at different angles in order to thin the massive shell wall. When the desired thinness had been achieved, the core was tapped out. This technique produced a distinctive core bearing flat grinding planes that intersect at different angles (Huckell and Huckell 1979:Figure 56) and had a roughly triangular cross-section. The last method has been described by Haury (1976:306) as standard among the Hohokam. It differs from the other two approaches in that it leaves no revealing core behind. The craftsmen at Snaketown simply abraded the crown of the valve on a flat surface until it was worn completely through and then enlarged the hole with a stone reamer.

Previous studies have suggested that these methods may reflect cultural or regional preferences (Haury 1976; Huckell and Huckell 1979: 161-162), with incised cores restricted to Sonora, obliterated cores

characteristic of the Salt-Gila Hohokam, and the faceted core perhaps indicative of Patayan or other cultural influence in the shell-trade network. Data from Gila Bend area sites, however, tend to diminish the clarity of that conclusion. Cores were poorly represented in the sample from the two sites being studied here. The two fragments present were small and, at first glance, exhibited some facets. Closer inspection, however, revealed remnants of a flat grinding surface similar to that described by Haury. Wasley and Johnson (1965) briefly describe the shell recovered from their various excavations, carried out in the vicinity of the study area, and note in passing that the valve tops had been ground away to make the bracelets. An examination of this material revealed that almost all of the shell-manufacturing debris had been discarded. A few pieces from the Citrus Site (AZ T:13:2) had been retained, however. These show that the valves had been ground using the same apparent combination of techniques evidenced by the study sample. The flatly ground surface was dominant, but the aperture edges showed signs of easily differentiated grinding planes. An examination of the literature and of collections from other sites in southern Arizona likewise produced evidence of the overlap or coexistence of techniques. Attempts to plot the distributions of sites employing known techniques showed no clear-cut boundaries but rather an indistinct mixing of practices. Perhaps there was some cultural preference, as evidenced by the heartland Hohokam, but it may well be that simple individual, band, or local preference may have been the primary factor affecting technique distribution. Larger samples of manufacturing debris obtained from carefully controlled cultural and temporal contexts should help in solving this problem.

A final note of interest regarding the manufacture of bracelets in the study areas is the presence of 15 shell flakes that are the products of unifacially oriented, direct percussion carried out on the shell margins in order to alter the edge angle of the shell ring by eliminating the thin natural lip of the shell. Over 50 of these thin flakes were recovered from the Lago Seco Site (AZ Y:8:3), a Patayan campsite located to the south of Gila Bend (Huckell and Huckell 1979:154). The removal of these flakes produced roughed-out bracelet margins that are ideally suited for use as scrapers because of the thick, strong valve wall, the sharp edge produced, and the steep edge angle created by the flaking. None of the band fragments in the sample, however, exhibited any evidence of having been utilized in this capacity, but the possibility of such usage in other assemblages should not be overlooked, particularly in areas in which desirable lithic raw material was in short supply.

Conclusions

In common with residents of other villages in the Gila Bend region, inhabitants of AZ Z:1:7 and AZ Z:1:8 engaged in the task of creating valuable jewelry ornaments out of raw marine shell. Unfortunately, the small size and limited composition of the sample from the two sites

greatly restrict the kinds of data and conclusions that may be derived regarding the role of the sites in this important activity. Undoubtedly, a factor affecting the composition of the sample is that both sites were at one time quite extensive and were well known to local residents and amateur artifact collectors. The near-absence of complete bracelets and other common jewelry items, worked *Laevicardium* shell, and exotic or unusual genera may have been caused by visitors who, over the years, have gleaned the sites of the attractive or unique items that tend to be the most diagnostic, leaving only the more common material to produce a less than accurate picture of shell-working activities at the sites. With this in mind, it is difficult to draw any but the most general of inferences with any degree of conviction. Rather than present largely speculative observations, it might be more appropriate to point out some of the problems that characterize the evaluation of shell data and to suggest some directions in which research on shell assemblages might proceed in order to advance the study of the complex situation that existed in the Gila Bend region.

What is needed most at this time is, of course, more research that will develop and expand a comparative data base for the area. The small body of literature available and the few items recovered in surface surveys can do little more than suggest or tantalize. Sample procedures that take into account the varied contexts that exist within a site would also be important for developing more accurate concepts of the true range of shell-working activities that were conducted at a given location.

Once this kind of information is available, several questions may be dealt with. One of the most interesting involves the various reduction techniques used in bracelet manufacture and their possible cultural affinities. If such correlations can be demonstrated, they might be of help in delineating the role of non-Hohokam groups in shell procurement, reduction, and distribution.

Another interesting study would involve the examination of the quantity of shell that was worked in the Gila Bend area as opposed to the quantity that was worked at Snaketown and other major sites along the Gila and Salt rivers. Was the Gila Bend area the distributional and/or manufacturing center for Hohokam shell products? In a related vein, how does shell-jewelry production fluctuate through time in the Gila Bend area? Are there changes in style, volume, or output or in the manufacturing techniques employed that would suggest some divergent, independent creative input and innovation, or did close ties with consumers in the Hohokam heartland engender a continuum of rigid parameters for artistic and technological endeavors? It would also be of interest to determine what, if any, changes took place in shell-jewelry manufacture in the Gila Bend area with the advent of the Classic Period, a time characterized by major changes.

All of these questions and many more await answers. It is hoped that research in the Gila Bend area will continue so that this neglected

area can claim its rightful place in the prehistoric development of southern Arizona. Shell assemblages have the potential to provide additional data for, and insights into, the study of the Gila Bend area and should be considered in any research plan.

Faunal Material

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Of the 42 pieces of animal bone recovered during test excavations at AZ Z:1:7 and AZ Z:1:8, seven were identifiable as to species and 10 tentatively identifiable as to class. The remaining bone was too fragmentary and nondiagnostic to permit identification.

AZ Z:1:7

Identifiable bone from this site was limited to two pieces from a Black-tailed Jack Rabbit and one piece each from a Bobcat and White-tailed Deer (Table 8). The Bobcat bone was burned.

Table 8. Taxa identified from animal bone from AZ Z:1:7

Taxon	Elements	Minimum Number of Individuals
Class: Mammalia		
Lepus californicus (Black-tailed Jack Rabbit)	1 metatarsal, proximal end 1 left scapula, glenoid process	1
Lynx rufus (Bobcat)	1 right first phalange, complete	1
Odocoileus virginianus cousei (White-tailed Deer)	1 antler burr and fragment	1

AZ Z:1:8

Of the three pieces of identifiable bone recovered from this site, only one was positively identified (as Black-tailed Jack Rabbit). The second was probably from a domestic cow, and the third was from an unidentified, medium-sized mammal. The jack rabbit and unidentified mammal bones are burned.

Table 9. Taxa identified from animal bone from AZ Z:1:8

Taxon	Elements	Minimum Number of Individuals
Class: Mammalia		
Genus and species indeterminate	1 long-bone fragment	1
Lepus californicus (Black-tailed Jack Rabbit)	1 right ulna, proximal end	1
Artiodactyl cf. *Bos taurus*	1 first phalange, incomplete 10 fragments of long bone and epiphysis	1

Very little can be said about the identified faunal remains from AZ Z:1:7 and AZ Z:1:8. That Black-tailed Jack Rabbit (*Lepus californicus*) is the species most commonly identified is not unusual. As a food source, rabbits were an important resource for prehistoric and historic Indians living in the low desert region. At Snaketown, *Lepus californicus* represented 55.34 percent of the entire faunal collection (Greene and Mathews 1979:367).

A brief, but by no means exhaustive, check of readily available literature on Hohokam archaeology failed to reveal any mention of Bobcat (*Lynx rufus*) remains from Hohokam sites. The presence of such remains at AZ Z:1:7 can most likely be attributed to that animal's occasional use as a food item. The presence of White-tailed Deer (*Odocoileus virginianus cousei*) is also not unusual at Hohokam sites. This individual was identified to the subspecies level by the small size of the antler burr and fragment (Stanley J. Olsen, personal communication, 1979).

Finally, the presence of a domestic cow at AZ Z:1:8 can be attributed to recent cattle ranching in the area. All of these elements were collected from the surface and were weathered. Nevertheless, the size and morphology of the phalange are indicative of a cow-sized mammal.

CHAPTER 5

SUMMARY AND CONCLUSIONS

AZ S:16:36

The test excavations conducted at AZ S:16:36, though not as productive as had been hoped, do provide some additional insight into the "rock circle" sites of the Gila Bend area. First, both the petroglyphs and the lithic assemblage suggest re-use over an extended period of time. The petroglyphs are also indicative of a non-Hohokam origin. Second, the test excavations indicate that the stone circles do not reflect the presence of pits excavated into the pavement and substrate. Finally, the lithic assemblage seems to represent almost entirely a primary reduction process, although it should also be noted that some activities produce little macroscopically visible evidence of wear. A larger sample and more intensive analysis would be necessary to better evaluate this assemblage.

It is also impossible to assess at this time the extent to which this site may be representative of others to which it is at least superficially similar. The relationship between stone features and the lithic assemblage is, for example, questionable, since this site could be a multicomponent site whose portable artifacts are not contemporaneous with the features. A direct relationship would be difficult to establish without examination of more such sites in order to determine if rock circles and lithic assemblages of this kind regularly occur together. The presence of petroglyphs in conjunction with the rock circles has, however, been noted as a recurring pattern at other sites of this kind (Teague and Baldwin 1979).

The tentative inference that this site is not Hohokam and may evidence re-use over a significant period of time again suggests similarities to the Patayan sites of western Arizona and the Colorado River area. This possibility was discussed in the Phase I survey report (Teague and Baldwin 1978), and test excavations have produced no information that would serve to either eliminate or confirm this possibility. At present, the petroglyphs seem to offer the greatest potential for identifying the cultural origin of these sites.

AZ Z:1:7 and AZ Z:1:8

Because the sample obtained from these sites was quite small and almost certainly biased, it is not possible to draw any precise comparisons with assemblages at other excavated sites in the area. It is also important to note, however, that samples from previous excavations may not have been fully representative of the range of variation in domestic structures, in areas associated with particular activities, and in artifact assemblages associated with these. The difficulty and expense of attempting to define the pattern of occupation through time in large Hohokam villages have seriously limited the availability of data that are important in any attempt to define change in social organization in this area. The pattern of household aggregation apparent in the Sedentary Period Citrus Site is the only evidence of this type now available to us from the study area, but is unlikely to be the only such evidence potentially available. Studies directed toward acquiring information of this kind would be an important contribution to our understanding of this area.

At present, it can be noted that, at AZ Z:1:7 and AZ Z:1:8, the features and the range of functional artifact types, including those of flaked and ground stone, represent an assemblage of the functionally diverse kind normally associated with habitation areas. It is reasonable to infer that this assemblage is drawn from the normal range of domestic artifacts present in village contexts in this area at this time, although it cannot be concluded that it represents the full range of such artifacts.

In general, the percentages of decorated wares among the ceramics do not seem to differ substantially from those at other Colonial and Sedentary Period sites investigated by Wasley and Johnson. The percentages of Lower Colorado Buff Wares, however, do seem to differ. At AZ Z:1:7, where most proveniences seem to date largely to the Santa Cruz Phase, less than 0.4 percent of the ceramics were identified as Lower Colorado Buff Wares. This percentage seems to be consistent with the presence of some very limited evidence of Sacaton Phase occupation in the area investigated. At AZ A:1:8, the percentage of Lower Colorado Buff Wares was more than 7.3 percent, again consistent with the predominantly Sacaton Phase occupation of this area. This contrasts with the Gatlin Site, where Wasley and Johnson report that 704 (approximately 2 percent) of a total of 32,422 sherds were Lower Colorado Buff Wares. Unfortunately, it is not possible to evaluate the possible meaning of this difference. Not only does the sampling problem intervene, but there may well be some differences between ceramic identifications made in the earlier study and those made in this project. Because many of the collections from the earlier excavations were disposed of, this cannot be reevaluated. At most, these data may be interpreted as confirming that little contact with Patayan groups seems to have taken place prior to the Sacaton Phase. Whether differential contact is represented at different kinds of Hohokam villages must remain uncertain at this time.

Other information relevant to this issue is derived from the analysis of debris from shell-jewelry manufacture. The reduction process

used seems similar to that used at AZ Y:8:3, a Patayan site contemporaneous with the Hohokam Sedentary Period and apparently associated with the shell trade (Huckell 1979). This is an interesting, if not conclusive, verification of the relationship of Gila Bend area Hohokam with the Patayan shell-trade system.

Finally, the analysis of ceramics from the site and comparative petrographic studies of ceramics from other sites in the area (see Appendix A) tend to confirm a continuous definable local tradition in ceramic manufacture, reflected in the presence of Gila Plain, Gila Bend variety ceramics at sites dating qrom the Pioneer-Colonial to the Classic Period.

Conclusions

Test excavations at AZ S:16:36 have provided some additional information about the nature of the "rock circle" sites and have suggested some additional directions for investigation. Unfortunately, no information that would permit the integration of these sites into an interpretation of regional prehistory is available at this time.

Excavations at AZ Z:1:7 and AZ Z:1:8 have, on the other hand, made contributions to the interpretations of Gila Bend area prehistory. Indications of technological similarities in shell-manufacture techniques with those used by Patayan peoples and evidence of continuity in ceramic traditions throughout the occupation of the area tend to confirm that the people of the Gila Bend area were a distinct, local group that interacted with the Hohokam of the central Salt-Gila area, but also enjoyed economic ties with other populations. Further research in the area may contribute to an understanding of this interaction and of the nature and effects of economic and social ties in prehistoric southern Arizona. This research should take the form of more comprehensive excavations of individual sites. While the presence of a platform mound or of villages, with or without ballcourts, can provide evidence that social differentiation did exist, it does not enable us to define the nature of this differentiation, nor does it provide convincing evidence of its origins within the society. Furthermore, it is important that we achieve a better understanding of the nature of site distributions in the areas surrounding the Gila Valley. At present, the areas immediately north and south of the Gila in this area are thought to contain few permanent settlements. It is probable, however, that this belief is, to some extent, the result of insufficient survey rather than actual absence of sites. The Javelina Mountain villages, as well as those identified in other recent studies in the Papaguería, provide evidence of this.

The persistent problem in current and future research in the Gila Bend area is that of the substantial destruction of sites in the riverine environment. It will never be possible to address adequately questions of the distribution of sites in these areas. We must instead rely upon

the distributional information already available and upon inferences drawn from the internal characteristics of single sites and from the distribution of sites away from the river. Nevertheless, the potential for productive research remains high. This report provides a reconstruction of the mechanisms that might have produced the Hohokam society of the Gila Bend area that, though certainly speculative, opens up increasingly interesting avenues for research.

The preceding discussions illustrate the need to design research related to the prehistory of the Gila Bend area not in terms of whether these people were Hohokam, but in terms of defining their relationship to a regional system and, at times, to several such systems. By ascertaining the manner in which these people participated in such a system, we may better understand the nature of the system as a whole and the crucial factors in its integration.

Groups in areas peripheral to more cohesive social groups may take on characteristics of one of these groups in such a way that cultural identity is inferred by the archaeologist. Nevertheless, total assimilation is rare, and these peripheral groups do not necessarily share the totality of the dominant social, economic, and political patterns considered characteristic of the adjacent cultural system, nor does the peripheral group necessarily develop indefinitely in perfect parallel to the central elements of the system. The local conditions of the natural and cultural environment are unique. While this may seem self-evident, the temptation to simplify leads too easily to an assumption that when the people of Gila Bend became "Hohokam," their identity became fixed. Changes in integrating factors could easily lead to the trends observed at Gila Bend: an increasing similarity to the central Salt-Gila through the Sedentary Period and a pronounced shift towards ties with other areas during the Classic Period. Exchange is suggested as one mechanism of regional integration that may in part account for prehistoric events in the Gila Bend area.

In their earlier study of the Painted Rock Reservoir, Wasley and Johnson (1965) repeatedly refer to evidence of trade. While the possibility that the origin of the Gila Plain pottery in this area could be attributed to trade was rejected (1965:13), and it was inferred that trade was relatively uncommon during the Colonial Period, it was proposed that, during the Sedentary Period, "trade was maintained with groups living to the north, south, east, and west" (1965:28). Wasley and Johnson also stated that the closest contact during the Sedentary Period seems to have been with the manufacturers of Lower Colorado Buff Wares (1965:28). The idea that groups in the Gila Bend area participated very actively in a trading relationship with other groups is therefore not new, but has not been adequately examined as a significant economic, social, and political force in the prehistoric development of that area.

The argument that the introduction of irrigation technology would have been an insufficient impetus for the spread and maintenance of the

Hohokam regional system was advanced earlier. Technological innovations may have many consequences, among them population growth, political and social change, and, in some cases, the acquisition of resources adequate to support coercive power. The transmittal of a superior technology is not, however, normally accompanied by transmittal of the specific cultural attributes of the originating group. It is unreasonable to suppose that irrigation alone might have made the people of peripheral areas Hohokam.

Indeed, there are only a few major mechanisms that may do this on a large scale. Migration is one, conquest another. Since the people of the Gila Bend area appear to have differed from those of the Salt-Gila area even early during their history, migration from the central Salt-Gila (possibly a factor) is not in itself sufficient explanation for the initial appearance of Hohokam people here.

As an alternative explanation for this integration, conquest can, in this case, best be described as farfetched. For the early periods, there is no evidence of conflict or of the resources with which regional domination might have been enforced.

Economic ties, on the other hand, remain as a mechanism capable of tying together communities, and regions, in a complex and interdependent network.

APPENDIX A

PETROGRAPHIC ANALYSIS OF FOUR SHERD TYPES FROM THE GILA BEND AREA OF ARIZONA

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Archaeologists engaged in the analysis of prehistoric ceramics are interested primarily in three research domains: a) the distribution of various ceramic forms over time and space, b) the reconstruction of the prehistoric manufacturing process, and c) the distinguishing of trade ware from locally produced ceramics. Because variation in the prehistoric pottery is limited by the choice of manufacturing techniques and by sources of raw materials, macroscopic examination of prehistoric pottery has enabled the archaeologist to define and interpret most of the ceramic variations. This methodology has produced the current ceramic typology, which can be applied to the three previously mentioned research domains. Occasionally, the archaeologist must distinguish between similar plain wares or put undecorated sherds into categories that are defined by decorative patterns. Petrographic analysis of prehistoric pottery is a relatively new technique that can make significant contributions to the solution of these problems. This report summarizes the analysis of 46 sherds from the Gila Bend area of Arizona.

Wasley and Johnson (1965:12) distinguish one type (Gila Plain) from a local variety (Gila Plain, Gila Bend variety) of plain ware in the Gila Bend area. The Gila Bend variety is distinguished from its type category (Gila Plain) by the presence of little or no mica as a paste component. Wasley and Johnson (1965:25) also indicate that Santa Cruz Red-on-buff is stratigraphically earlier than Sacaton Red-on-buff at the Gatlin Site (AZ Z:2:1), but point out (1965:27) that it is impossible to distinguish the two types when the sherds do not display sufficient decoration. Petrographic analysis was employed to examine the temper and clay components of the sherds in an attempt to distinguish these four ceramic types.

Materials and Methods

Forty-six sherds were received for analysis from the Arizona State Museum. The sherds were dehydrated, trimmed to 12-mm squares, and

placed in catalyzed (0.05-percent benzoyl peroxide), deinhibited acrylic monomer (50-percent methyl methacrylate, 50-percent ethyl methacrylate) for 24 hours. Each sherd was placed in a plastic mold with a plexiglass base and soaked under vacuum and refrigeration for 72 hours in partially polymerized ethyl-methyl methacrylate. The methacrylate was polymerized at 50 degrees C and 50 p.s.i. nitrogen for 72 hours.

The embedded sherds were cut with an Isomet low-speed diamond saw, and, after washing in soap and water, one cut face was glued (Buchler Epoxide) to a frosted petrographic glass slide. The excess sherd and acrylic were trimmed off with the Isomet saw. The sherd sections were thinned with 120-, 240-, and 600-grit Carbimet abrasive papers. The thin sections were covered with No. 2 cover glasses and permount mounting media.

Each thin section was examined with a BHP Olympus polarizing microscope. The structural components of each sherd (such as quartz and muscovite) were identified using standard optical mineralogy techniques. At 13x magnification, an ocular grid with 100 points was positioned midway between the sherd surfaces at each end of the thin section. The number of points superimposed on each mineral was tabulated and the frequencies from the two counts averaged (see Tables 9-12). These values provide good estimates of the volume (expressed as a percentage) of each sherd component and are not particle counts. This steriological technique is the simplest means of describing ceramic composition. The paste was analyzed at 100x magnification by positioning the grid between the large temper particles. Although this methodology does not accurately characterize the original clay composition (because small temper particles are included), it does produce a meaningful description of the plastic paste component of the sherd.

Results

Paste Analysis

Analysis of the paste components at 100x magnification indicates that each of the four ceramic types is composed of the same proportions of clay and quartz fragments (see Table 13). The only significant difference is the low proportion of muscovite in the Gila Plain, Gila Bend variety sherds. This is consistent with the distinction between the Gila Plain type and Gila Bend variety made by Wasley and Johnson (1965:25). Solely on the basis of the low porportion of muscovite in the paste, four Gila Plain sherds (5867, 4478, 6308, and 9421) might be Gila Bend variety; five other sherds, however, are just above the dividing point (that is, 3 to 4 percent muscovite). No Gila Bend variety sherds would be classified as Gila Plain using this criterion, which suggests that the personnel sorting the sherds have very specific criteria in mind when they classify a sherd as Gila Bend variety.

Plain Ware Temper Analysis

The two plain ware types are readily distinguished by the proportions of their temper components observed at 13x magnification (see Table 14). Both plain ware types are composed of the same proportions of paste and quartz, but differ in the proportions of schist, muscovite, and grog. The Gila Plain sherds are characterized by the presence of schist and a high proportion of muscovite. Gila Bend variety sherds have no schist and only half the proportion of muscovite observed in the Gila Plain sherds (see Table 14). Eight (67 percent) of the Gila Bend variety sherds are grog-tempered. The grog appears to be derived from quartz-tempered sherds. On the basis of the absence of schist and the low proportion of muscovite in the paste, six sherds typed as Gila Plain (4486, 5867, 4478, 5837, 0308, and 9421) might be Gila Bend variety. Solely on the basis of the presence of schist in the temper, no Gila Bend variety sherds would be classified as Gila Plain (although two sherds, 9483 and 2922, exhibit high muscovite proportions), but all of the Gila Plain sherds from AZ T:13:9 would be classified as Gila Bend variety.

The Gila Plain sherds exhibit a considerable amount of variability in temper composition by site (see Table 15). The Gila Plain sherds from AZ Z:1:7, AZ T:13:8, AZ Z:2:1, and Javelina Springs all contain moderate amounts of schist and quartz tempering with smaller proportions of muscovite. The temper materials are large and angular and appear to be derived from a coarsely ground schist. The Javelina Springs sherds are the exception in that they have smaller temper particles, which probably indicates that the schist was more finely processed.

The Gila Plain sherds from AZ T:13:9 have no schist component in the temper, which is composed primarily of quartz and muscovite. Sherds from AZ Z:1:8, on the other hand, have an abundance of schist, with little free quartz and muscovite. These two sites represent the extremes of variation and are also the most distant geographically. The geographic distribution of the sites and the covariation of the relative proportions of the three major temper components suggest two explanations for the observed temper variation: 1) the parent schist varies in decomposition from a crumbly rock to a quartz mica sand, or 2) the schist was processed (ground or crushed) differently at each of the sites. It should be noted that increased proportions of schist are associated with fewer voids (air pockets) and produce a superior ceramic product.

The Gila Bend variety sherds are fairly uniform in temper composition (schist is absent) but also exhibit intersite variability. Sherds from AZ Z:1:8, AZ Z:1:7, and AZ T:13:8 all have quartz and muscovite as major temper components. The particles are smaller in size than in the Gila Plain sherds and appear to be derived from finely processed schist. All of the grog observed as a temper component is quartz-tempered. The sherds from AZ T:13:8 contain the smallest volumes of temper and also have the highest volume of voids of all sherds in this study. The decrease

in temper volume produced an inferior ceramic vessel. The sherds from AZ T:13:9 are unique in the high proportion of grog temperings. The primary temper of sherds 2922 and 6774 is basalt-tempered grog. The free quartz and muscovite were probably derived from crushing the grog temper and/or adding a small amount of finely processed schist. Sherd 8039 contains no grog; its quartz-muscovite temper is probably derived from finely processed schist or granite, but could also be a muscovite-contaminated sand.

Decorated Ware Temper Analysis

The temper components of Santa Cruz Red-on-buff and Sacaton Red-on-buff are virtually identical, with the greatest variability observed in the proportion of schist. The Sacaton Red-on-buff sherds contain half (4.6) the proportion of schist found in the Santa Cruz Red-on-buff sherds (9.0) (see Table 14).

The temper composition of the Santa Cruz Red-on-buff sherds from AZ T:13:9 and Javelina Springs is relatively uniform. The major temper source is probably schist, and the inverse relationship between schist and quartz indicates that temper processing was highly variable (see Table 11). The Santa Cruz Red-on-buff sherds from AZ Z:1:7 exhibit tempers that are extremely heterogeneous. Two sherds (5601 and 3433) contain the proper proportions of schist, quartz, and muscovite to indicate a schist tempering similar to that in the sherds from AZ T:13:9. Sherd 9113 has a large grog component and a quartz-muscovite ratio indicative of finely processed schist. Sand, probably introduced with the grog or schist, is also a distinctive component of this sherd's temper. The high frequency of quartz and low frequency of muscovite in conjunction with the small grain size of the muscovite (which means it is probably a clay component) indicate that two sherds (4911 and 3814) are sand-tempered.

The Sacaton Red-on-buff sherds are fairly similar in temper composition between the two sites. The parent temper material is schist, with one grog-tempered sherd (6130). The variable proportions of schist, quartz, and muscovite in the sherds are the result of differential processing of the temper material.

Conclusions

1. Gila Plain, Gila Bend variety, can be distinguished from Gila Plain by the absence of schist, the lower volume of free muscovite, and the frequent inclusion of grog in the temper.

2. Santa Cruz Red-on-buff cannot be distinguished from Sacaton Red-on-buff on the basis of temper composition.

3. There is a high degree of idiosyncratic variability in temper composition and preparation among and within sites, especially for the decorated ceramics.

4. Most of the intersite variation in temper compositon appears to be correlated with geographic distance and can be attributed to either a) variability in the degree of schist decomposition, or b) local tradition that dictates the extent of temper processing. A geomorphological survey of the Gila Bend area will be necessary to select the more likely of these two alternatives.

Table 10. Average counts of temper, taken at 13x magnification on 100 points, by site and sherd for Gila Plain

Sherd Number	Paste	Schist	Quartz	Muscovite	Feldspar	Grog	Voids
AZ Z:1:8							
1600	53.0	42.0	1.5	1.5	0.0	0.0	1.5
3189	54.5	39.5	6.0	0.0	0.0	0.0	0.0
3365	55.0	40.0	2.5	2.5	0.0	0.0	0.0
AZ Z:1:7							
1500	51.0	27.0	16.0	4.5	0.0	0.0	1.5
5358	45.5	17.0	22.5	14.5	0.5	0.0	0.0
4456	53.0	35.5	9.5	2.0	0.0	0.0	0.0
Javelina Springs							
8694	46.0	33.0	10.0	10.5	0.0	0.0	0.5
2839	53.0	25.5	16.5	3.0	0.0	0.0	2.0
4486	59.5	0.0	32.0	4.5	0.0	0.0	4.0
AZ T:13:9							
5867	44.0	0.0	36.0	14.0	0.0	0.0	6.0
4478	50.5	0.0	39.0	5.0	1.5	0.0	4.0
5837	49.5	0.0	25.0	18.0	0.0	0.0	7.5
AZ T:13:8							
1795	52.0	20.5	22.0	4.0	0.0	0.0	1.5
1200	44.5	14.0	27.0	10.5	0.0	0.0	3.5
0308	62.5	0.0	29.5	4.0	0.0	0.0	4.0
AZ Z:2:1							
2252	67.0	11.5	9.5	8.0	0.0	0.0	4.0
0970	51.0	6.0	30.0	6.5	0.5	0.0	6.0
9421	46.5	0.0	46.5	1.5	0.0	0.0	5.5

Table 11. Average counts of temper, taken at 13x magnification on 100 points, by site and sherd for Gila Plain, Gila Bend variety

Sherd Number	Paste	Schist	Quartz	Muscovite	Feldspar	Grog	Voids
AZ Z:1:8							
9356	56.5	0.0	27.0	3.5	2.0	3.5	7.5
9483	56.0	0.0	28.5	11.5	0.0	0.0	4.0
9038	56.0	0.0	41.5	1.0	0.0	0.0	1.5
AZ Z:1:7							
1381	55.5	0.0	28.5	2.0	1.0	1.0	12.0
1634	61.0	0.0	32.5	2.0	1.0	2.5	1.0
4191	56.0	0.0	34.0	3.0	1.0	3.5	2.5
AZ T:13:9							
2922	54.5	0.0	5.0	8.0	0.5	27.5	4.5
6774	37.5	0.0	8.0	2.0	6.5	36.5	9.5
8039	60.0	0.0	30.5	3.5	0.5	0.0	5.5
AZ T:13:8							
5679	68.0	0.0	10.0	3.5	1.5	0.0	17.0
5219	77.5	0.0	11.0	0.5	0.0	4.0	7.0
6087	74.5	0.0	13.0	1.5	0.0	11.0	0.0

Table 12. Average counts of temper, taken at 13x magnification on 100 points, by site and sherd for Santa Cruz Red-on-buff

Sherd Number	Paste	Schist	Quartz	Muscovite	Feldspar	Sand	Grog	Voids
AZ Z:1:7								
4911	65.5	0.0	30.5	0.5	0.5	2.5	0.0	0.5
3814	49.0	0.0	43.5	2.5	1.5	0.0	0.0	3.5
5601	57.0	13.5	9.5	17.5	0.0	0.0	0.0	2.5
9113	65.0	0.0	14.0	2.0	0.0	7.5	6.0	5.5
3433	63.0	24.0	9.0	3.5	0.0	0.0	0.5	0.0
AZ T:13:9								
9931	55.5	27.5	10.5	3.5	0.0	0.0	0.0	3.0
3915	69.5	8.5	17.5	3.5	0.0	0.0	0.0	1.0
1848	71.0	13.5	7.5	6.0	0.0	0.0	0.0	2.0
Javelina Springs								
2817	69.5	2.5	23.5	3.5	0.0	0.0	0.0	0.0
7566	66.5	0.0	22.5	4.5	0.0	0.0	0.0	6.5

Table 13. Average counts of temper, taken at 13x magnification on 100 points, by site and sherd for Sacaton Red-on-buff

Sherd Number	Paste	Schist	Quartz	Muscovite	Feldspar	Sand	Grog	Voids
AZ Z:1:8								
3275	73.5	12.5	10.0	1.5	0.0	0.0	0.0	1.5
6130	61.5	3.5	23.5	5.0	0.5	0.0	2.5	3.0
9731	60.5	0.0	28.0	6.0	0.5	0.0	0.0	5.0
AZ Z:2:1								
2121	67.0	11.5	9.5	8.0	0.0	0.0	0.0	4.0
6875	58.0	0.0	26.5	7.5	0.0	0.0	0.0	8.0
4155	68.5	0.0	20.0	5.0	0.0	0.0	0.0	6.5

Table 14. Means and standard deviations of mineral counts of paste on 100-point grid at 100x magnification, by pottery type

Type	Number of Sherds	Clay	Quartz	Muscovite	Voids
Gila Plain	18	77.9±5.8	11.7±4.9	6.3±6.4	3.2±2.2
Gila Plain, Gila Bend Variety	12	81.5±6.4	11.8±4.8	0.8±1.1	5.5±4.3
Santa Cruz Red-on-buff	10	80.6±5.2	10.5±2.9	5.2±3.8	3.4±4.1
Sacaton Red-on-buff	6	83.0±3.8	10.2±4.7	4.8±2.1	2.0±2.1

Table 15. Means and standard deviations of temper counts on 100-point grid at 13x magnification, by pottery type

Type	Number of Sherds	Paste	Schist	Quartz	Muscovite	Grog	Sand	Feldspar	Voids
Gila Plain	18	52.1± 6.2	17.3±16.0	21.2±13.1	6.4±5.1	0.0	0.0	0.1±0.4	2.9±2.4
Gila Plain, Gila Bend Variety	12	59.4±10.4	0.0	22.4±12.2	3.5±3.2	7.4±12.0	0.0	1.2±1.8	5.4±5.2
Santa Cruz Red-on-buff	10	63.2± 7.1	9.0±10.4	18.8±11.5	3.2±4.7	0.0*	1.0±2.4	0.2±5.0	2.4±2.2
Sacaton Red-on-buff	6	64.8± 5.8	4.6± 5.9	19.6± 8.1	5.5±2.3	0.0**	0.0	0.2±0.3	4.7±2.3

*Two sherds have grog in the temper.

**One sherd has grog in the temper.

Table 16. Average temper counts on 100-point grid at 13x magnification by site and pottery type

Site	Number of Sherds	Paste	Schist	Quartz	Muscovite	Grog	Sand	Feldspar	Voids
Gila Plain									
AZ Z:1:8	3	54.2	40.7	3.3	1.3	0.0	0.0	0.0	0.5
AZ Z:1:7	3	49.8	26.5	16.0	7.0	0.0	0.0	0.2	0.5
Javelina Springs	3	52.8	19.5	19.5	6.0	0.0	0.0	0.0	2.2
AZ T:13:9	3	48.0	0.0	33.3	12.3	0.0	0.0	0.5	5.8
AZ T:13:8	3	53.0	11.5	26.2	6.2	0.0	0.0	0.0	3.0
AZ Z:2:1	3	54.8	5.8	28.7	5.3	0.0	0.0	0.2	5.2
Gila Plain, Gila Bend Variety									
AZ Z:1:8	3	56.2	0.0	32.3	5.3	1.2	0.0	0.7	4.3
AZ Z:1:7	3	57.5	0.0	31.7	2.3	2.3	0.0	1.0	5.2
AZ T:13:9	3	50.7	0.0	14.5	4.5	21.3	0.0	2.5	6.5
AZ T:13:8	3	73.3	0.0	11.3	1.8	5.0	0.0	0.5	8.0
Santa Cruz Red-on-buff									
AZ Z:1:7	5	59.9	12.5	21.3	5.2	2.2	2.0	0.4	2.4
AZ T:13:9	3	65.3	16.5	11.8	4.3	0.0	0.0	0.0	2.0
Javelina Springs	2	68.0	1.2	23.0	4.0	0.0	0.0	0.0	3.2
Sacaton Red-on-buff									
AZ Z:1:8	3	65.2	5.3	20.5	4.2	0.8	0.0	0.3	3.2
AZ Z:2:1	3	64.5	3.8	18.7	6.8	0.0	0.0	0.0	6.2

APPENDIX B

WOOD CHARCOAL FROM AZ Z:1:8

by

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Two small float samples were analyzed from AZ Z:1:8, a Santa Cruz-Sacaton Phase site near Gila Bend, Arizona. Both samples were small and produced no carbonized remains besides wood charcoal.

1. Feature 10: Sample volume 0.3 liter; recovered material 4.3 grams.

   This sample was from an ashy stratum, probably material swept from a hearth. Most of the sample weight consisted of modern rootlets and small pebbles. Two fragments of mesquite charcoal (*Prosopis*) that probably represent firewood were recovered.

2. Feature 10: Sample volume 1.0 liter; recovered material 30.4 grams.

   This sample consisted of the burnt fill of a posthole. Most of the sample was composed of the fragmentary remains of a palo-verde (*Cercidium*) post. Several pieces of mesquite charcoal and uncarbonized seeds of *Chenopodium* (50+), *Mollugo* (10), and *Opuntia* (2) reflect postoccupational filling of the posthole.

It may be useful to compare wood charcoal from AZ Z:1:8 to material from the Big Ditch Site (AZ BB:2:2), a large site located near the confluence of Aravaipa Creek and the San Pedro River. Although the occupation of the Big Ditch Site was longer than at AZ Z:1:8, ranging from the Snaketown to Tanque Verde Phases, most of the plant remains were from contexts contemporaneous with the occupation of AZ Z:1:8.

The majority of the wood at the Big Ditch Site that could definitely be interpreted as construction material (from postholes and roof fall) was either palo-verde or cottonwood, while the charcoal

associated with hearths or floors around hearths evidenced a mixture of cottonwood, palo-verde, and mesquite, with mesquite slightly dominant (Miksicek and others, n.d.). Perhaps soft trees such as palo-verde or cottonwood were preferred as building material because they could be easily cut with stone axes. On the other hand, wind fall or deadwood of any species could be utilized as fuel, with a minor preference for mesquite when it was available. Although it is difficult to generalize from two samples, a similar pattern seems to be in evidence at AZ Z:1:8.

Carbonized cobs and kernels of Chapalote, Pima Papago, and Harinoso de Ocho maize and screwbean mesquite pods (*Prosopis pubescens*) have been recovered from several other sites in the Gila Bend area (Cutler 1955), but were not present in the samples from AZ Z:1:8.

APPENDIX C

POLLEN SAMPLES FROM AZ Z:1:8

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Two pollen samples from Feature 10 at AZ Z:1:8 were examined for the presence of pollen of economically important plant types. It should be noted that, within the area surrounding Gila Bend, stream terraces are under cultivation to produce cotton and sugar beets.

Methods

Pollen samples were extracted from the matrix, using the techniques of Mehringer (1968). A known quantity of Eucalyptus was added to the sample as an exotic in order to determine Absolute Pollen Frequency (APF) (Davis 1965). The pollen was mounted on a slide in glycerol, and a No. 1 cover slip (22 mm x 50 mm) was placed over the slide. When possible, 200 pollen grains were counted (Martin 1963). When pollen concentration appeared low, 100 exotic grains were counted and Absolute Pollen Frequencies calculated.

Results

APF values were calculated for each pollen sample, using the equation:

$$\frac{\text{Total pollen counted} \times \text{Total exotic added}}{\text{Exotic pollen counted}} \div \text{grams/sample} = \text{APF per gram}$$

Both samples contained sufficient pollen to count.

Table 16 lists percentage values for pollen types recovered from the fill of Feature 10. This sample was taken from 1.23 m west of datum, 0.30 m below datum, in the northeast quadrant of Feature 10 on July 14, 1978. It has a fairly high pollen concentration of 18,701 grains per graim. The sample also contained a high percentage (2 percent) of *Zea* spp. pollen, which indicates the presence of corn.

AD-A144 452 TEST EXCAVATIONS AT PAINTED ROCK RESERVOIR: SITES AZ Z:1:7 AZ Z:1:8 AND AZ S:16:36(U) ARIZONA UNIV TUCSON L S TEAGUE NOV 81 2/2

UNCLASSIFIED F/G 5/6 NL

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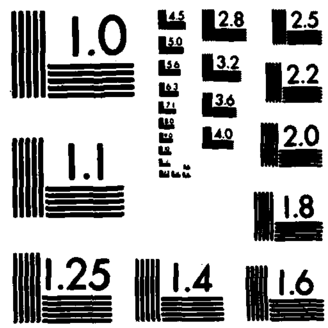

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table 17. Percentages of pollen types from fill of Feature 10, AZ Z:1:8

Pollen Type	Percent
Pinus spp.	0.5
Cheno-Am	92.0
Gramineae	2.0
Ambrosia spp.	0.5
Malvaceae	0.5
Zea spp.	2.0
Celtis spp.	0.5
Unidentifiable	1.0

Table 18. Percentages of pollen types from charcoal concentration in postholes, Feature 10, AZ Z:1:8

Pollen Type	Percent
Cheno-Am	93.0
Pinus spp.	2.0
Quercus spp.	1.0
Unidentifiable	4.0

Table 17 lists percentage values of pollen types recovered from the charcoal concentrations that fill the postholes in the feature. This sample, which was taken on July 14, 1978, has a pollen concentration value of 6808 grains per gram. No pollen of any economically valuable plants was found.

Conclusions

The presence of *Zea* spp. pollen in the first sample is indicative of the presence of corn (or of corn pollen, presumably used for ceremonial purposes). Both samples contain high values of Cheno-Am pollen. *Amaranthus* spp. is known as a food plant, but it is not uncommon to find high concentrations of Cheno-Am pollen throughout the Southwest in disturbed areas. Thus, while *Amaranthus* spp. was probably available for use, the presence of this pollen in these samples probably has no cultural significance.

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